Canada Alberta

FOREST RESOURCE DEVELOPMENT AGREEMENT
ENTENTE SUR LA MISE EN VALEUR DES RESSOURCES FORESTIERES

Canada

Alberta

The Canada-Alberta Forest Resource Development Agreement is a subsidiary agreement of the Canada-Alberta Economic and Regional Development Agreement, which provides coordination and cooperation between the governments of Alberta and Canada in areas of Alberta's economic development.

The Canada-Alberta Forest Resource Development Agreement is funded equally by the governments of Canada and Alberta, from April 1, 1984, to March 31, 1989.

Its primary objectives are to ensure the long-term availability of timber supplies; to optimize timber uses; and to contribute to the growth and diversification of Alberta's economy.

The Agreement comprises three programs: Reforestation; Applied research, technology transfer and opportunity identification; and Public information, evaluation and administration. These programs are managed by a joint Directorate and are implemented by the Canadian Forestry Service and the Alberta Forest Service.

L'Entente Canada-Alberta sur la mise en valeur des ressources forestières est auxiliaire à l'Entente Canada-Alberta sur le développement économique et régional, qui vise à assurer la coordination et la coopération des deux gouvernements relativement au développement économique de l'Alberta.

L'Entente Canada-Alberta sur la mise en valeur des ressources forestières est financée à parts égales par les gouvernements du Canada et de l'Alberta, et a cours du 1er avril 1984 au 31 mars 1989.

Ses objectifs principaux sont assurer la disponibilité à long terme de réserves de bois; optimiser leur utilisation; et contribuer à la croissance et la diversification de l'économie de la province.

L'Entente comprend trois programmes: Reboisement; Recherche appliquée, transferts de connaissances techniques et relevé des occasions; et Information, évaluation et administration. Ces programmes sont gérés par un Bureau de direction conjoint, et mis en oeuvre par le Service canadien des forêts et le Service forestier de l'Alberta.

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A BUSINESS OPPORTUNITY AND MARKET STUDY OF VALUE ADDED PAPER MANUFACTURING IN THE PROVINCE OF ALBERTA

Volume I

EKONO Consultants Ltd.[1]

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ABBREVIATIONS AND DEFINITIONS

The following is a list of notations, abbreviations, units and symbols appearing in this report.

AAC	annual allowable cut
ADt	air dry ton (90% dry)
BCTMP	bleached CTMP
BDT	bone dry ton
BDU	bone dry unit, 2400 lbs dry weight
BK	bleached kraft pulp
CAD	Canadian dollars
CCN	clay coated news
CGWD	coated groundwood
cm	centimeters
CTMP	chemithermomechanical pulp
dbh	tree diameter measured at breast height
FBB	European type of multilayer folding boxboard
g	gram, 10^{-3} kilogram
GJ	gigajoule, 10^9 joules
h	hour
hwd	hardwood species
IRR	internal rate of return
kg	kilogram
kW, kWh	kilowatt(s), kilowatt-hour(s)
LWC	light-weight coated paper
m^3	cubic meter
MTU	miscellaneous timber uses
MW, MWh	megawatt(s), megawatt-hour(s)
PGW	pressurized groundwood pulp
RMP	refiner mechanical pulp
ROI	100* (operating profit/total capital requirement)
SBK	semibleached kraft pulp
SBS	solid bleached sulphate
SC	supercalandered pulp
SGW	stone groundwood pulp
SUS	solid unbleached sulphate
swd	softwood species
tb	ton board
TDA	timber development area
TMP	thermomechanical pulp
ton, t	metric ton (1000 kg)
Total Capital Requirement	fixed investment + change in working capital + interest during construction
tp	ton paper
UBK	unbleached kraft pulp
UGWD	uncoated groundwood
USD	U.S. dollars
yr	year

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EXECUTIVE SUMMARY

The Wood Resource

Sufficient uncommitted annual allowable cut (AAC) plus residual chips exist in the three forest areas of northeastern Alberta to support the manufacture of 175,000 ton/yr of supercalandered uncoated groundwood paper (SC), light-weight coated groundwood paper (LWC) or newsprint. Alternatively, a 130,000 ton/yr folding carton boxboard plant could be supported by the same resource base. There is also enough excess fiber to support expansion to other grades of paper and/or a medium sized pulp mill.

Annual Allowable Cut in Northeastern Alberta Forest Areas (a)

Forest Area	Uncommitted AAC (thousand m^3/yr) Coniferous	Chips(b)	Deciduous
Athabasca/Lac La Biche TDA	362.3	113.2	992.7
Athabasca Forest	709.0	--	785.8
Slave Lake Forest	311.0	--	863.4
Total AAC	1382.3	113.2	2641.9
Total coniferous	1495.5		

(a) Values indicate AAC and chip supply after deducting possible redirection of chip supply, an OSB commitment, and a Peace River development.

(b) Residual chips from Fort McMurray, Hanging Stone and House River.

The Market Study

The market study focuses on groundwood containing value-added papers because of Alberta's advantage of having abundant high quality wood, especially in coniferous species, and low cost energy. The demand/supply structure in the target market areas, Western Canada, the U.S. West (West of the Mississippi and Ohio Rivers) and the Pacific Rim (Japan, Korea and the People's Republic of China), shows a current and future "import" demand as follows:

Paper Grade	"Import" Demand (thousand ton/yr) Current	1992	2000	Growth %/yr
SC-paper	275	365	890	8.1
LWC-paper	490	610	1300	6.7
Carton board	960	995	960	0.0

Clearly, the growth potential is for groundwood containing printing papers, i.e. SC and LWC grades. Furthermore, the market study indicates that the highest potential exists in the U.S. West and in the Pacific Rim areas, particularly California and Japan, respectively.

Comparative Economics

Softwood costs including chipping are estimated to be CAD 29 to 35 per m^3 (CAD 79-95 per BDT) delivered to the study millsite of Fort McMurray. This puts the cost of Alberta softwood significantly below that of Scandinavia, but on a par or slightly higher than that of other areas of North America. The availability of residual chips at the current Alberta average delivered price of CAD 60 per BDU (CAD 55 per BDT) tends to keep the total price of wood furnish to the study millsite at a reasonable level.

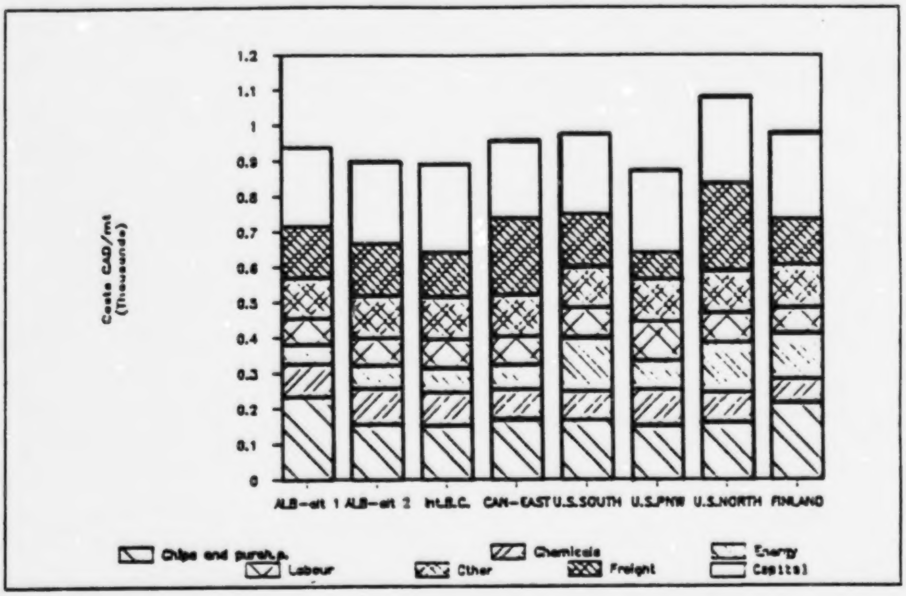
Energy costs in Alberta are low, particularly electricity at CAD 24 per MWh. Alberta is a major factor in natural gas production. Currently gas is sold in industrial quantities at an estimated CAD 1.80 per GJ.

When direct manufacturing costs (excluding depreciation and other capital charges) are compared for SC-paper, Alberta has an advantage over competitors in the following locations:

Location	Advantage
U.S. Pacific Northwest	CAD 40/ton
U.S. North	CAD 70/ton
U.S. South	CAD 80/ton

Compared to British Columbia, however, SC-paper produced in Alberta costs CAD 8/ton more.

The net back sales price requirement (manufacturing costs plus freight costs plus levelized capital charges, including an inputed interest rate) in the Los Angeles area indicates that, due to shorter distances, a Pacific Northwest producer of SC-paper has a distinct advantage over all other producers. Alberta, however, does have an advantage over competitors located in eastern Canada, the U.S. South, the U.S. North and Finland.



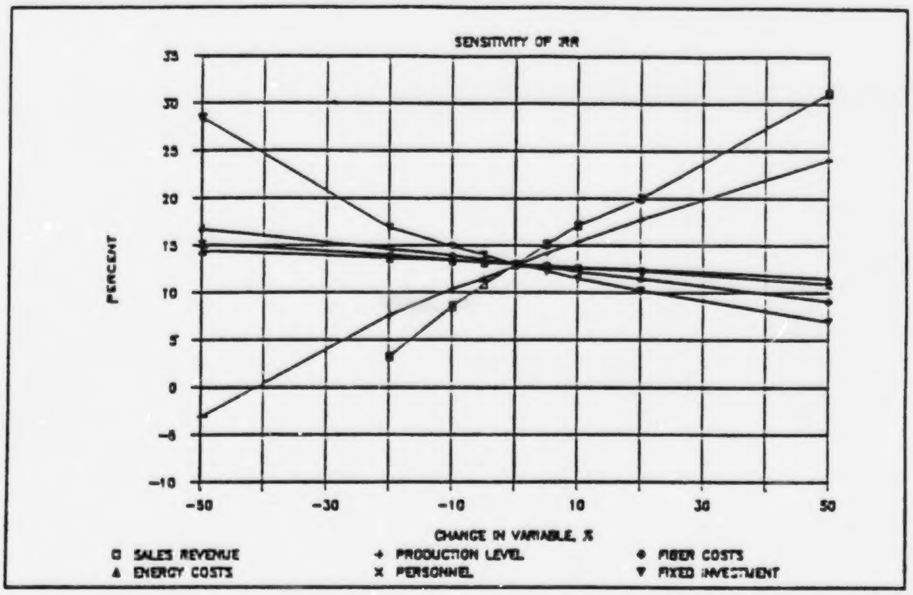
Sales Price Requirement, SC Paper Delivered to Los Angeles

Similar results are obtained when comparing manufacturing costs and sales price requirements for LWC-paper grades and folding boxboard produced in Alberta.

Profitability and Sensitivity Analysis

A 320 million USD investment in a greenfield 175,000 ton/yr SC-paper facility located at Fort McMurray will yield an IRR of 13% (before financing and taxes) and a simple ROI of 18%.

For a LWC-paper mill, the IRR and ROI are 6% and 12%, respectively. These indicators of potential profitability are considered marginally adequate in the context of the long term strategic development of forest resources in northeastern Alberta and the cost of relatively risk free capital. Furthermore, the profitability is extremely sensitive to changes in production rates or sales revenue, and to a lesser degree, the investment cost. Again, similar results are seen for both LWC and folding boxboard.



Sensitivity of IRR to Changes in Selected Variables - SC Paper Manufacturing

Business Opportunities and Risk Factors

It is clear that Alberta's softwood supply is such that it can be utilized to produce very high quality value-added paper grades. As pulping and papermaking technology and paper markets develop, Alberta's massive hardwood inventory can come into play. Furthermore, Alberta's preeminent position in producing, distributing and selling low cost energy enhances a papermaker's ability to produce paper and paperboard cost effectively. Of no little importance, Alberta has a track record of positiveness toward industrial development, especially with regards to the forest products industry.

But this in itself is not enough to attract an investor to Alberta in order to build and operate a value added papermaking facility. Certain risk factors have to be addressed and minimized.

Variations in production rate and sales revenue both have been identified as significantly affecting the profitability of an investment to produce value-added papers. To minimize this risk, any potential investor must have proven marketing and technical know-how: the first to minimize the time and cost necessary to penetrate markets and to cost effectively produce a paper of a quality that demands high prices and volume.

Such an investor will probably not be interested in a stand alone, one time only, investment in a value-added paper mill. This investor will take a long view of the situation; he will want to plan for growth - to develop a diversified forest products complex. This long view will depend on whether or not wood will be available in the quantity, quality and at a cost that permits paper tonnage increases, entry into new paper markets or even back-integration to a chemical pulping operation. Considering that a bleached softwood kraft mill of a size generally recognized as large enough to produce reasonably priced fiber (360,000 tons/yr), a wood supply of over 2 million m^3 annually will be needed. This is 50% more than is currently available in the northeastern Alberta forest areas. Thus to the extent that both Alberta and the investor are desirous of the long term optimal use of forest resources, the province should make the additional wood available at a competitive cost.

A third risk identified in this study is the capital cost of the value-added facility. The investor profiled as being best able to invest in such a project will have large capital resources. He also will most likely have the option of adding onto an existing mill somewhere else than in Alberta. It is generally accepted that exercising such an option would cost 25 to 40 percent less than a greenfield mill. The implication is clear: if an investor is to be attracted to Alberta to build a greenfield mill a subvention by the province may be required to reduce the investor's capital outlay to the point where the profitability is high enough to balance the main risk factors of market price and volume fluctuations.

Finally, freight costs have long been recognized as an impediment to investment in Alberta. This study confirms this, showing the adverse effect of transportation costs on the required net back sales price. To some extent specialty paper grades, e.g. SC and LWC, are believed to be less affected by distance to the consumer than are commodity paper grades, e.g. newsprint. Also, given that specialty paper grades are increasingly marketed on a world wide basis, Alberta is relatively closer to U.S. markets than are Nordic countries. In any case, Alberta should continue its work to find a solution to reduce transportation costs.

1. INTRODUCTION

1.1 Background

The Government of Alberta desires a more efficient utilization of their fiber resources. One way to accomplish this end is to establish, over the short term, a value-added paper and/or paperboard manufacturing facility which would lead to the long term development of a diversified forest products industry.

Currently Alberta produces 480,000 tons/year of bleached and unbleached kraft pulp, all of which is shipped from the province for further value-added processing. Although there have been significant activities toward value-added production processes in Alberta over recent years, paper manufacturing has not yet been part of them.

The intention of this study is to determine whether there is a market for selected paper grades manufactured in Alberta, and whether or not such a facility could be cost effective enough to maintain and support a profitable business operation now and in the future.

Prior to the commencement of the work, it was concluded in discussions between Government representatives and EKONO that the report should exclusively concentrate on the domestic, the Western U.S. and the Pacific Rim markets. Furthermore, a selection of four (4) value added paper and board grades was made: supercalendared uncoated groundwood paper (SC), light weight coated groundwood paper (LWC) and folding carton boxboard, representing special grade products, and newsprint as a commodity grade. These grades were selected based on the acknowledged strengths and weaknesses of potential paper manufacturing in Alberta: The availability of fairly slow growing, good quality wood raw material and inexpensive power as opposed to long distances to potential markets.

1.2 Report Contents

Section 2 presents the availability of the current raw material situation in Alberta, explicitly addressing both the availability of fiber from the Athabasca/Lac La Biche, and the Athabasca and Slave Lake Forests, and from existing and planned pulp mills. Also, a discussion of the availability of energy and paper making chemicals is included.

Section 3 briefly addresses the criteria for the selection of the paper and board grades studied.

Section 4 examines the market situation and the potential for market penetration in the selected areas, emphasizing the current and future demand/supply structure, market growth and the effect of technological change on various market segments.

Section 5 contains the evaluation of Alberta's cost competitive position as a manufacturer of value-added paper.

In Section 6, the cost structure of the two selected alternatives, SC- and LWC-paper manufacturing, is linked to the profitability analysis. A feasibility analysis is presented for a greenfield SC-paper mill and a LWC-paper mill.

Section 7 evaluates the business opportunities and identifies the major risk factors in developing a value-added paper manfufacturing facility. It also provides a potential investor profile and lists selected potential investors that in EKONO's opinion fulfills the conditions required for a successful paper manufacturing business operation in Alberta over the long term.

2. STATUS OF RESOURCE

2.1 Fiber Resources

2.1.1 General

To manufacture paper or paperboard in Alberta will require substantial fiber resources, both from raw wood and chemical pulp. The fiber sources and quantities needed are listed in Table T.2.1 for each of the four paper or paperboard grades considered in this study. As will be shown, Alberta can meet these fiber needs, both in quantity and type.

Table T.2.1 Estimated Fiber Needs for Alberta Based Paper and Paperboard Manufacturing(1)

Fiber Source	Quantities (tons per year) News(2)	 UGWD(3)	 CGWD(4)	 FBB(5)
Wood				
Softwood	165,000	109,000	67,000	67,000
Hardwood	--	--	--	--
TOTAL WOOD	165,000	109,000	67,000	67,000
" " (m^3/yr)	452,100	298,600	183,600	183,690
Kraft Pulp				
Bleached SWD	--	30,500	54,000	21,000
Semibleached SWD	18,500	--	--	31,600
TOTAL PULP	18,500	30,500	54,000	52,600

(1) Assumes full integration with mechanical pulping process
(2) 175,000 ton/year newsprint
(3) 175,000 ton/year uncoated groundwood paper (SC)
(4) 175,000 ton/year coated groundwood paper (LWC)
(5) 130,000 ton/year folding carton boxboard

2.1.2 Wood Resources

The vast forest resources of Alberta can be divided into the five regions depicted in Figure F.2.1. Also shown are the two bleached kraft mills at Grande Prairie and Hinton and the bleached CTMP mill at Whitecourt. The later is currently under construction. Table T.2.2 shows the total resources available for pulpwood utilization in each region. The current annual allowable cut and volume commitments in the five regions are summarized in Table T.2.3.

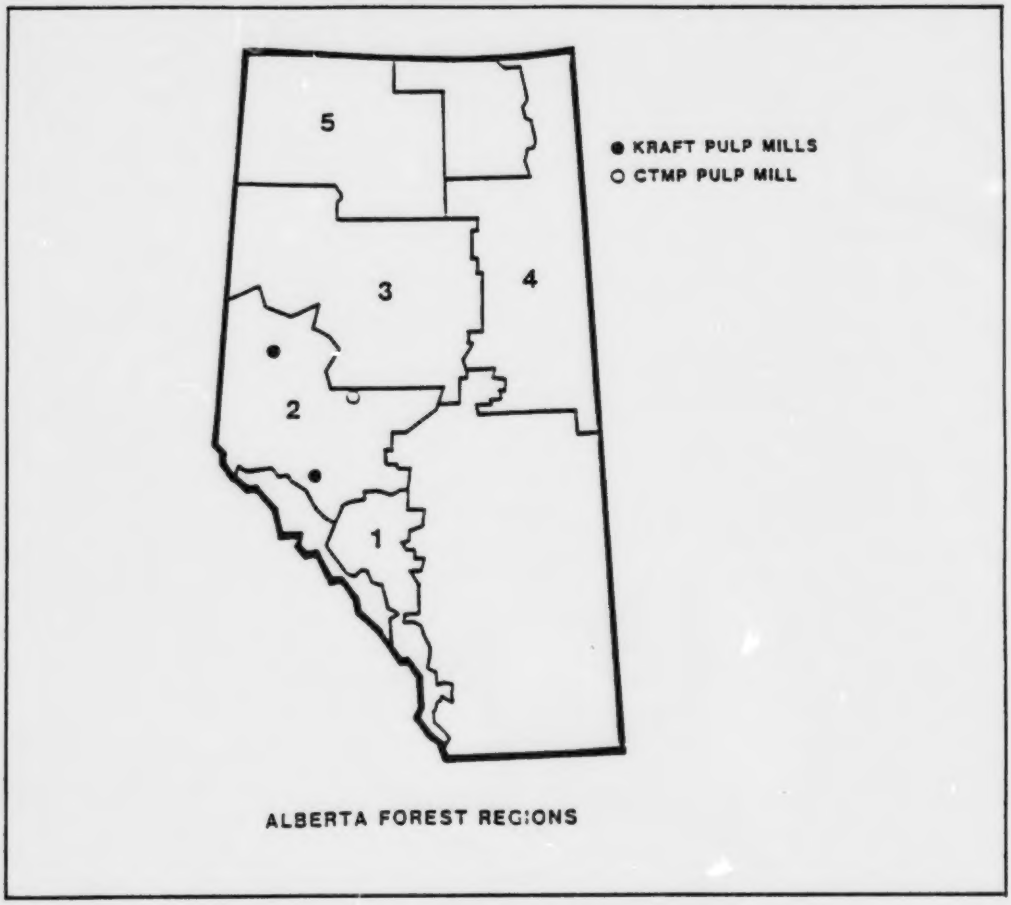

5
4
3
2
1
● KRAFT PULP MILLS
○ CTMP PULP MILL
ALBERTA FOREST REGIONS

Figure F.2.1. ALBERTA FOREST REGIONS

Table T.2.2. Alberta Pulpwood Inventory

	REGIONS					
Specie	1	2	3	4	5	Total
			(million m^3)			
A. Softwoods (13-24 cm dbh)						
White Spruce	14.1	27.8	21.9	9.6	24.8	98.1
Black Spruce	7.1	34.9	15.5	6.1	4.0	67.5
Balsam Fir	2.8	7.4	3.4	1.1	0.4	15.1
Lodgepole/Jack Pine	60.3	127.0	20.4	13.6	2.9	224.3
TOTAL CONIFEROUS	84.2	197.0	61.2	30.4	32.2	404.9
B. Hardwoods (13 cm + dbh)						
TOTAL DECIDUOUS (1)	35.4	201.9	229.1	87.5	95.3	649.3
TOTAL PULPWOOD	119.6	398.9	290.3	117.9	127.5	1054.2

(1) 81% aspen, 16% balsam poplar and 3% birch.

Table T.2.3. Summary of Annual Allowable Cut and Annual Volume Commitment (thousand m^3/yr)

	REGIONS					
	1	2	3	4	5	All Regions
A. Coniferous Timber						
Annual Allowable Cut	1,714	6,409	2,829	1,796	1,600	14,348
Volume Committed						
Forest Management Areas	101	3,871	18	0	0	3,990
Timber Quotas	1,025	1,644	1,372	353	942	5,336
MTU	73	187	166	35	65	526
Other	0	21	508	8	0	537
Total Committed	1,199	5,723	2,064	396	1,007	10,389
Volume Uncommitted	515	686	765	1,400	593	3,959
Percent Uncommitted	30.0	10.70	27.0	78.0	37.1	27.6
B. Hardwood Timber (Pure and Mixed Wood Stands)						
Annual Allowable Cut	503	2,765	4,475	1,603	2,088	11,434
Volume Committed	283	2,160	848	0	0	3,291
Volume Uncommitted	220	605	3,627	1,603	2,088	8,143
Percent Uncommitted	43.7	21.9	81.1	100.0	100.0	71.2
C. Total Timber						
Annual Allowable Cut	2,217	9,174	7,304	3,399	3,688	25,782
Volume Committed	1,482	7,883	2,912	396	1,007	13,680
Volume Uncommitted	735	1,291	4,392	3,003	2,681	12,102
Percent Uncommitted	33.2	14.1	60.1	88.3	72.7	46.9

Note: These data provided by the Alberta Forest Service reflect the uncommitted AAC (annual allowabel cut) as of May 12, 1986. Later developments have significantly reduced the uncommitted AAC in Regions 1 and 2.

Table T.2.3 shows that the resource is enough to support additional pulp and paper operation in Alberta. The scope of this study was limited to the following three areas, namely: Athabasca forest, Athabasca/Lac La Biche TDA and the Slave Lake forest. The annual allowable cut (AAC) in each area is tabulated in T.2.4. Clearly sufficient AAC exists in any one of the three areas to support any one of the facilities listed in T.2.1. A value added paper manufacturing facility located near Fort McMurray could be adequately supplied with coniferous roundwood from the Athabasca Forest and nearby chips leaving a significant amount of the AAC for future expansion.

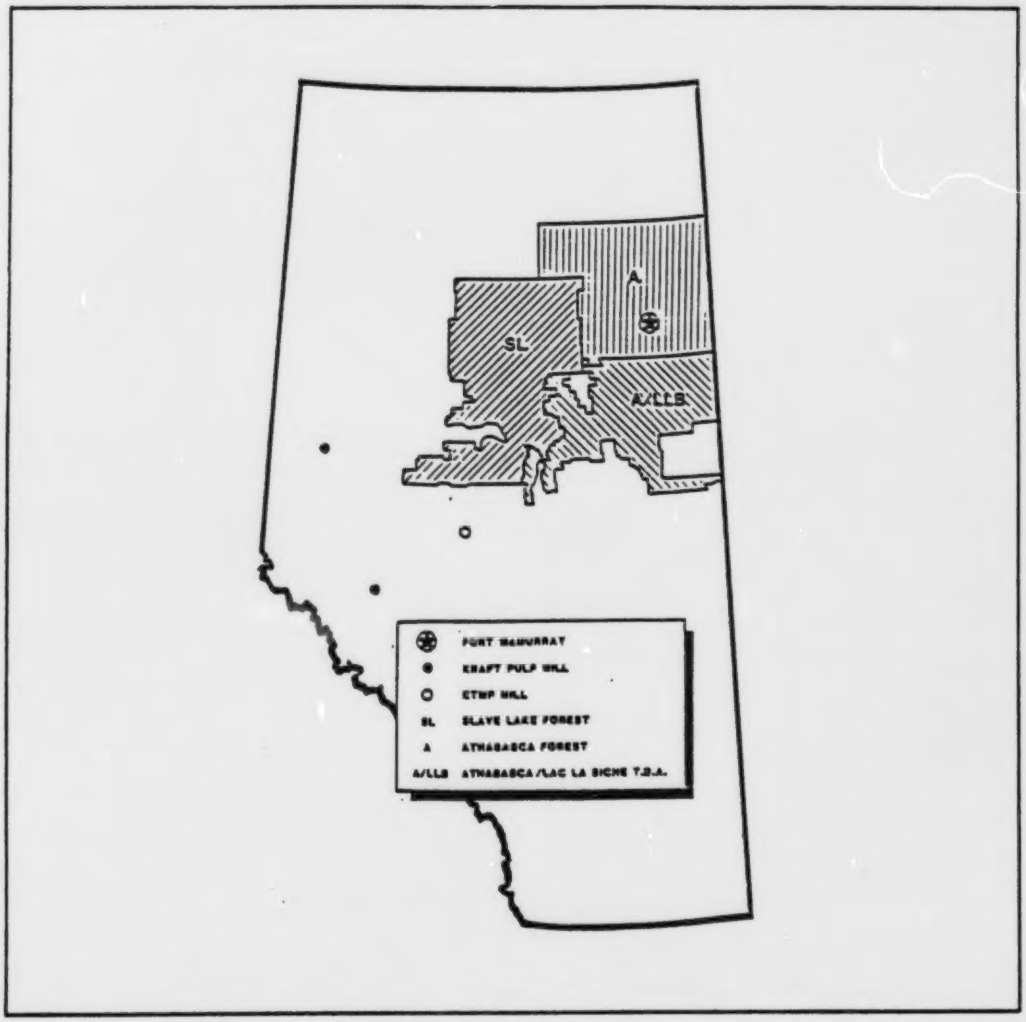

A
SL
A/LLB
FORT McMURRAY
● KRAFT PULP MILL
○ CTMP MILL
SL SLAVE LAKE FOREST
A ATHABASCA FOREST
A/LLB ATHABASCA/LAC LA BICHE T.D.A.

Figure F.2.2 FOREST RESOURCE AREAS IN NORTHEASTERN ALBERTA

Table T.2.4 Annual Allowable Cut in Northeastern Alberta Forest Areas (a)

Forest Area	Uncommitted AAC (m^3/yr) Coniferous	Chips (b)	Deciduous
Athabasca /Lac La Biche TDA (c)	362,316	353,750 (113,200)(d)	992,651
Athabasca Forest	708,987	--	785,842
Slave Lake Forest(c)	369,351 (310,996)	161,310 (0)	1,897,905 (863,405)
Total AAC (c)	1,440,654 (1,382,292)	515,060 (113,200)	3,676,398 (2,641,898)
Total Softwood (c)	1,955,714 (1,495,499)		

(a) Source: Timber Management Branch of Alberta Forest Service as of May 27, 1987.
(b) Existing chip supply from nearby locations.
(c) Values in brackets indicates AAC and chip supply after deducting possible redirection of chip supply, an OSB commitment, and a Peace River development
(d) Chips from Fort McMurray, Hanging Stone, and House River.

2.1.3 Pulp Resources

Table T.2.5 shows the current and planned pulp production in Alberta. The Whitecourt mill will produce both SWD and HWD CTMP pulps in separate pulping lines. Comparing fiber requirements in Table T.2.1 it is concluded that the value added paper operation will have sufficient chemical/mechanical pulp available within the region.

Table T.2.5. Alberta Woodpulp Resources

Company and Location	Pulp	Capacity (tons/yr) Current	Planned
Procter & Gamble Cellulose Ltd Grande Prairie (1)	BK	290,000	290,000
Champion Forest Products Ltd Hinton	B&UBK	190,000	380,000 (2)
Millar Western Industries Ltd Whitecourt	BCTMP	(3)	207,000

(1) This mill is known to produce some HWD kraft pulp
(2) Scheduled for 1988-89
(3) Under construction. Startup late summer 1988

2.2 ENERGY

2.2.1 General

The process used to produce the value added products considered in this study will require significant amounts of energy in the form of electricity and natural gas. The approximate amounts needed are indicated in Table T.2.6.

Table T.2.6. Energy Requirements for Producing Paper and Paperboard(1)

Product	Natural Gas (2) GJ/ton	Natural Gas (2) TJ/year	Electricity kWh/ton	Electricity TWh/year
Newsprint (3)	4.0 (0.0)	700 (0)	3260	570
SC Paper (3)	4.5 (2.0)	790 (350)	2430	425
LWC Paper (3)	6.5 (4.6)	1140 (810)	1950	342
FBB Paperboard (4)	6.3 (5.2)	820 (680)	2020	263

(1) Assumes integration with mechanical pulping process; Energy to produce chemical pulp not included.
(2) Values in () assume heat recovery from mechanical pulping process
(3) 175,000 tons/year
(4) 130,000 tons/year

2.2.2 Natural Gas

Alberta has abundant natural gas resources. Proven reserves are about 1.7 x 10^{12} m^3 or 67 percent of the Canadian total. In 1984, 80.7 x 10^3 m^3 was produced giving a proven reserve life of 21 years. New discoveries tend to maintain the reserve life between 25-30 years.

Gas is transported in Alberta over 102,537 miles of pipelines. Figure F.2.3 shows the pipeline network. Pipelines crossing provincial boundaries are federally regulated; all intra-provincial pipelines are regulated by the Alberta Energy Resources Conservation Board.

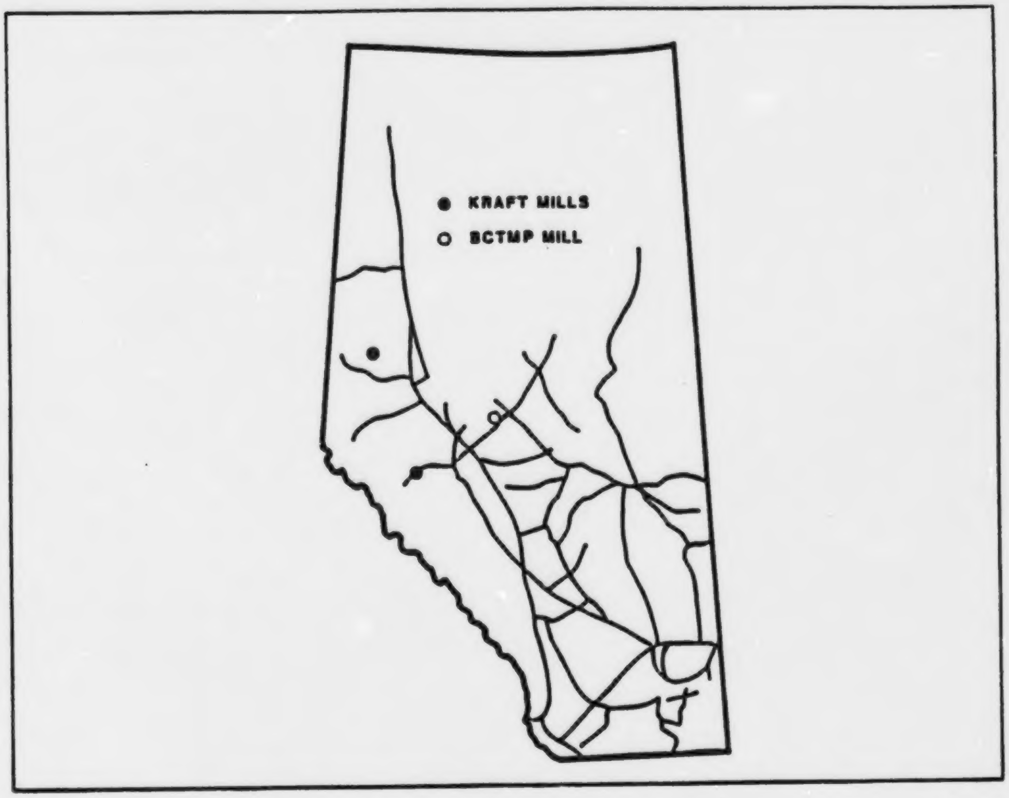


Figure F.2.3. GAS PIPELINES OF ALBERTA

2.2.3 Electricity

There are four electric power utilities, two investor-owned (IOU's) and two municipally owned (Public). These utilities and their installed capacities are listed in Table T.2.7.

Table T.2.7. Alberta Electrical Utilities

Utility	Estimated Capacity (MW)
Alberta Power Ltd (IOU)	1300
Transalta Utilities Corp (IOU)	4000
Edmonton Power (Public)	1300
Medicine Hat Power (Public)	140

Electric energy production in 1982 totalled 27,112.4 GWh. Of this, 15 percent, 66 percent and 19 percent were supplied by hydro, coal and natural gas, respectively.

All utilities are part of the Alberta interconnected system which is managed as if it had single owner. In this way electricity is delivered to the user with the maximum efficiency and lowest cost.

2.3 Chemical Resources

The existing chemical industry includes sulphur and petroleum industry products, as well as chlor-alkali industry. Alberta is the world's largest exporter of elemental sulphur. In 1984, production was about 5.2 million tonnes and total sales were about 8 million tonnes. Sulphur is produced as a by-product of natural gas production in approximately 50 plants around the Province. Smaller amounts are produced by Alberta's two tar sands plants and several refineries.

Pulping chemicals currently manufactured in Alberta include sulphur chemicals (e.g. sulphur, sulphur dioxide and sulphuric acid) as well as chlor-alkali chemicals (e.g. sodium hydroxide, chlorine). Other pulping chemicals e.g. hydrogen peroxide, saltcake, lime are being "imported".

Essentially no papermaking chemicals are currently being produced within Alberta. Clays and coating materials for a paper mill would have to be imported from the U.S.A. There are plans to commence production of calcium carbonate and clays in Western Canada (calcium carbonate in Eastern British Columbia, clay in Southern Saskatchewan both by Ekatoon Industries of Alberta).

3. IDENTIFICATION OF POTENTIAL VALUE ADDED PAPER AND BOARD PRODUCTS

Definitions of paper grades and pulping processes are constantly evolving as modifications in the processes occur. In order to clarify the various processes available, the following guidelines will be used in this study:

Chemical pulping:	Includes both pure chemical and semichemical (e.g. NSSC) pulping. Yield ranges from 45 percent to about 85 percent. Cooking chemicals and dissolved organic compounds are normally recovered.
Mechanical pulping:	Includes a variety of pulping processes: Chemimechanical (CMP), Chemithermomechanical (CTMP), Thermomechanical (TMP), Pressurized Groundwood (PGW), Stone Groundwood (SGW), Refiner Mechanical (RMP), etc. Yield ranges normally from 85 percent to 96 percent. Normally no recovery of chemicals.

Due to the lack of strong chemical treatment (cooking and bleaching) in the mechanical pulping, the defects found in the wood raw material are readily seen as a lower quality of the final product and as a lower reliability of the paper machine. Thus the availability of high quality wood fiber, especially softwood, is an essential requirement for the production of high quality groundwood papers. The removal of lignin in cooking and bleaching processes makes the chemical pulping less sensitive to the quality of wood.

About 50 percent of wood material is dissolved in the chemical pulping. These dissolved organic compounds are further burnt in a recovery boiler in order to produce steam and electrical power. As a result of this energy recovery, modern chemical pulp mills are self-sufficient regarding fuel and electrical power. On the other hand, mechanical pulping requires significant amounts of external energy, especially in the form of electricity.

From the environmental point of view, the effluents and emissions from a mechanical pulp mill are easier and less expensive to handle than the ones from a chemical pulp mill.

The two main advantages, high quality wood and low cost energy, that the Province of Alberta could offer to a potential paper maker clearly support the production of paper/board grades based on mechanical pulp in Alberta.

Newsprint, uncoated groundwood paper, coated groundwood paper and bleached board (including bristols) are the main consumers of mechanical pulp as shown in Table T.3.1. Because the quality characteristics of bristols are close to the ones of bleached board, bristols are here included into bleached board.

Table T.3.1. North American Paper and Board Classification

Grade	% Mech. Pulp	% Chem. Pulp	% Filler & Coat
PAPER:			
- Newsprint	90	10	-
- Uncoated groundwood paper	55	20	25
- Coated paper			
-- Groundwood	35	30	30
-- Freesheet	5	65	30
- Uncoated freesheet	5	95	-
- Bristols	30	70	-
- Cotton paper	-	-	-
- Unbleached kraft packaging Paper	-	100	-
- Other packaging paper	-	100	-
- Special industrial paper	-	100	-
- Tissue	-	100	-
BOARD:			
- Unbleached kraft board	-	100	-
- Bleached board			
-- Solid bleached sulfate	-	90	10
-- Folding boxboard	45	45	10
- Corrugating medium	-	100	-
- Recycled board	-	-	-

In coated and uncoated freesheet papers, as well as in packaging and tissue papers, the portion of mechanical pulp in the fiber furnish is only 0-10 percent. The extensive use of chemical pulp in these grades doesn't emphasize the optimization of the utilization of existing high quality fiber resources in the province. Additionally the production of these grades probably requires the integration of a paper mill with a chemical pulp mill. On the other hand, an economical greenfield integrated paper mill requires extensive capital investment, which is difficult to defend in todays' forest products industry environment. In tissue manufacturing also the bulkiness of the product, which leads to high transportation costs, is a disadvantage for a potential Albertan producers.

Based on the reasons above the four value added paper/board grades selected for a detailed market study are:

* Uncoated groundwood paper
* Coated groundwood paper
* Bleached board (folding boxboard)
* Newsprint

4. MARKET SURVEY

4.1 General

4.1.1 Objectives

The contents of the market survey part of the study includes the analysis of the demand/supply situation and the structure of the markets for uncoated groundwood paper, coated groundwood paper, bleached board and newsprint in the geographical market areas, namely the domestic, the Western U.S. and the Pacific Rim, selected for the analysis.

The objectives of the market survey are to analyze the markets in the selected three geographical areas by grade. The following information is provided as a base for the analysis:

1. Current market volume and demand/supply structure, including

   * Consumption
   * Domestic production
   * Exports
   * Imports by origin of shipment

2. Current domestic production capacity by mill.

3. Announced/planned/assumed supply capacity changes in the market area by the year 2000.

4. Demand development in the market area by the year 2000.

5. Imports demand development by the year 2000.

6. Major end users

7. Identification of main competitors in the market area.

The market survey is structured based on the paper/paperboard grades that initially had been selected as potential value-added products for the Province of Alberta. Those grades are:

* Uncoated groundwood paper
* Coated groundwood paper
* Solid bleached paperboard
* Newsprint

The markets for these paper grades in the selected market areas are discussed in each of the Sections 4.2, 4.3, 4.4 and 4.5 respectively.

4.1.2 Methodology

The market analysis and the resulting conclusions are based on data from EKONO files and additionally from various sources such as: American Paper Institute (API), Canadian Pulp and Paper Institute (CPPA), Statistics Canada, US Bureau of Census, Pulp and Paper, Resource Information Systems (RISI).

The demand forecasting method used in the study is based on a variety of end use indicators (advertising, housing, production, etc. indexes), on Gross National Product (GNP) and population growth. The technology development in the paper manufacturing and in the graphical arts industry as well as the basis weight development of the products, intergrade price relations and increasing higher quality requirements have also been taken into account in the analysis.

The production capacity forecasting is based mainly on announced or planned new paper machines, machine rebuilds, machine shut downs and grade changes. Based on past experience the capacity increase due to the continuous improvements in the production efficiency has been estimated to be on average one (1) percent/year. The assumed capacity forecast after 1992 is based on a combination of the demand growth, imports demand and the raw material availability in the market area.

4.1.3 Definition of the Market Areas

The three selected market areas for the four potential products manufactured in Alberta are:

1. Domestic Markets

   The domestic market area is defined to include the provinces of Alberta, British Columbia, Manitoba and Saskatchewan.

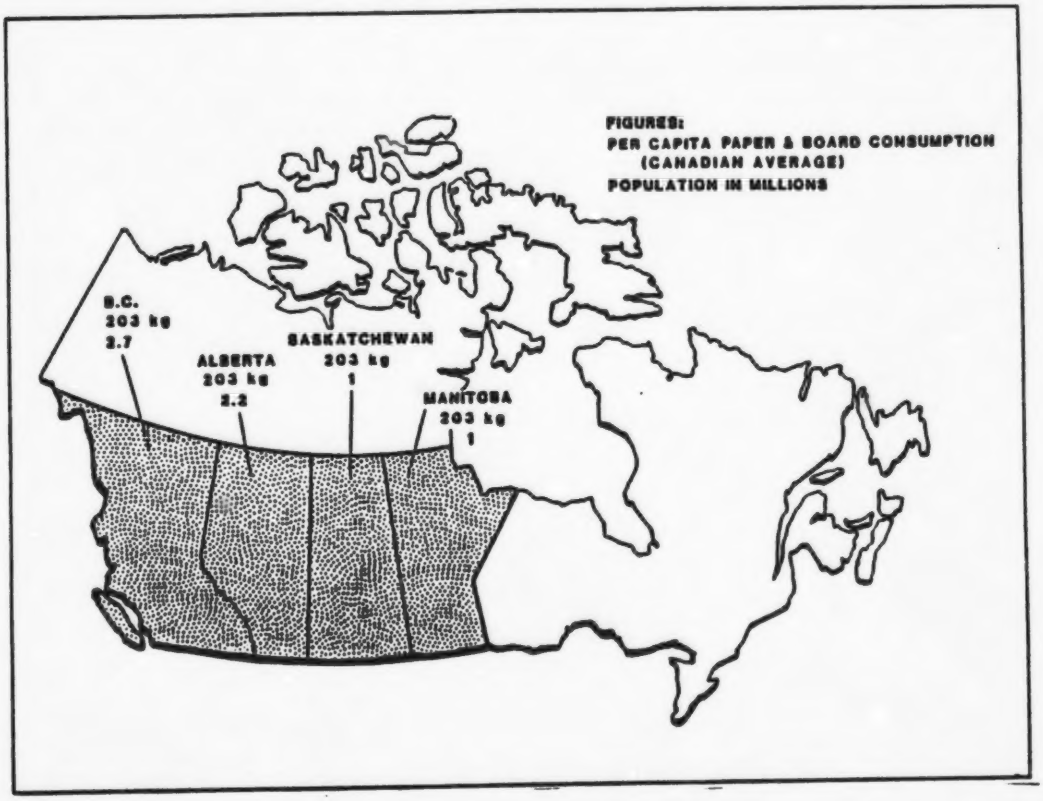

FIGURES:
PER CAPITA PAPER & BOARD CONSUMPTION (CANADIAN AVERAGE)
POPULATION IN MILLIONS
B.C.
203 kg
2.7
ALBERTA
203 kg
2.2
SASKATCHEWAN
203 kg
1
MANITOBA
203 kg
1

Figure F.4.1. DOMESTIC MARKETS

2. Western US Markets

The Western U.S. market area is in the study defined as U.S. West: California, Oregon, Washington, Idaho, Nevada, Utah, Arizona, Montana, Wyoming, Colorado, New Mexico, Alaska, Hawaii and U.S. North Central: North Dakota, South Dakota, Nebraska, Kansas, Minnesota, Iowa, Missouri, Wisconsin, Michigan, Illinois, Indiana, Ohio and U.S. West South Central: Oklahoma, Texas, Arkansas and Louisiana.

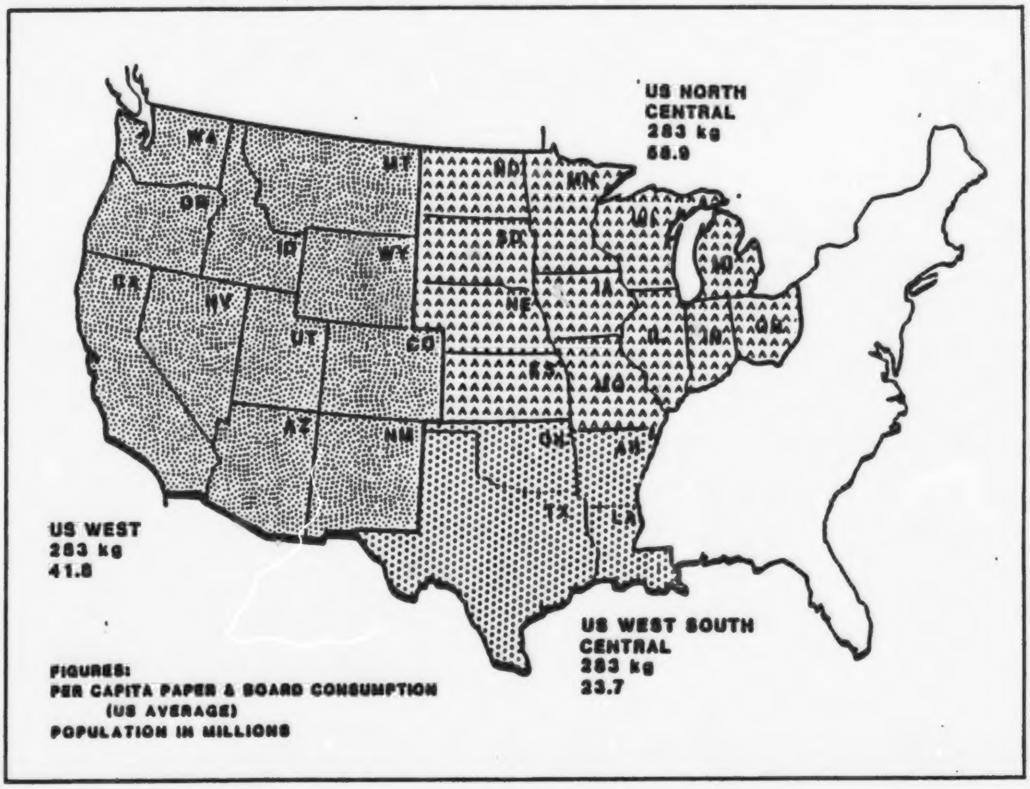
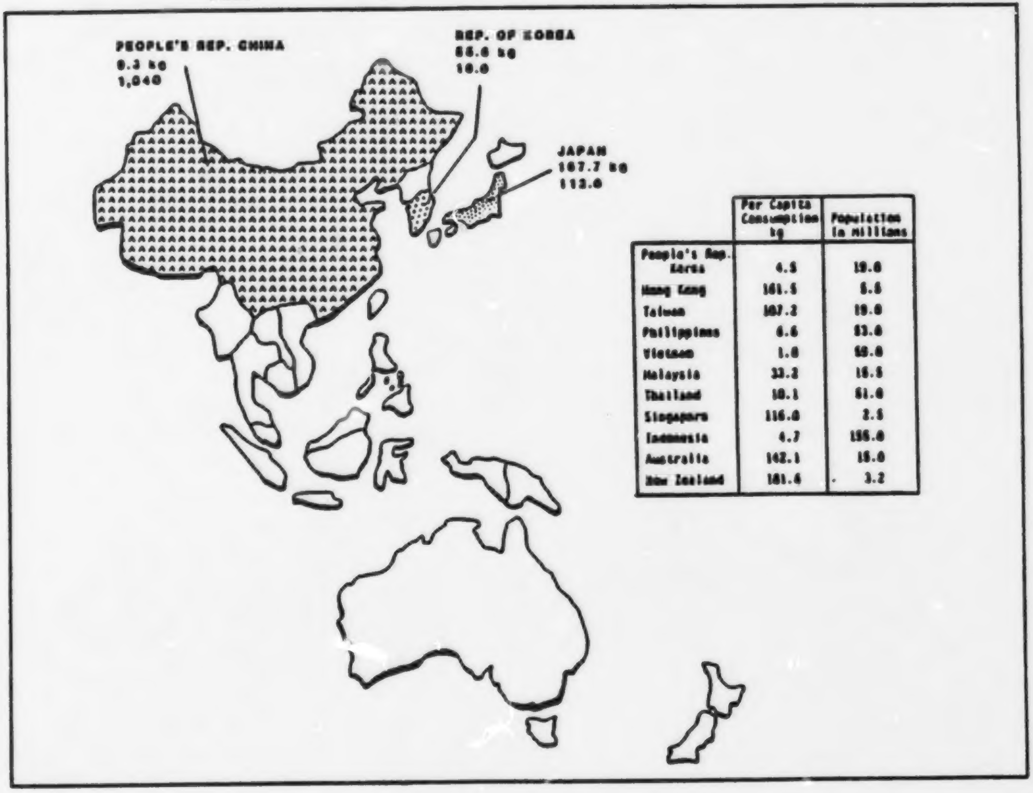

US NORTH
CENTRAL
283 kg
58.9
WA
OR
ID
MT
WY
CA
NV
UT
CO
AZ
NM
ND
SD
NE
KS
MN
IA
MO
WI
MI
IL
IN
OH
OK
AR
TX
LA
US WEST
283 kg
41.8
US WEST SOUTH
CENTRAL
283 kg
23.7
FIGURES:
PER CAPITA PAPER & BOARD CONSUMPTION
(US AVERAGE)
POPULATION IN MILLIONS

Figure F.4.2. WESTERN U.S. MARKETS

3. Pacific Rim Markets

The Pacific Rim market area is in this study defined as: Japan, Republic of Korea and People's Republic of China.


PEOPLE'S REP. CHINA
9.3 kg
1,040
REP. OF KOREA
55.6 kg
18.0
JAPAN
167.7 kg
113.0

	Per Capita Consumption kg	Population in millions
People's Rep. Korea	4.5	19.0
Hong Kong	161.5	5.5
Taiwan	107.2	19.0
Philippines	6.6	53.0
Vietnam	1.0	59.0
Malaysia	33.2	16.5
Thailand	30.1	51.0
Singapore	116.0	2.5
Indonesia	4.7	155.0
Australia	142.1	15.0
New Zealand	181.4	3.2

Figure F.4.3. PACIFIC RIM MARKETS

4.2 Uncoated Groundwood Papers

4.2.1 Classification of Uncoated Groundwood Papers

Uncoated groundwood papers are normally considered as valued added newsprint - the printing properties have been enhanced by superior brightness, smoothness, surface finish etc. They are used mainly as an intermediate printing paper between the standard newsprint and coated groundwood papers. The only exception is the groundwood forms paper, which is competing with uncoated freesheet forms. The common nominator for all of the uncoated groundwood papers is that they contain at least 10% mechanical pulp. Filler content varies from 0% in lightweight directory papers to above 30% in high quality supercalendared papers.

In the report uncoated groundwood is divided into four categories. The first three categories represent specific uncoated groundwood grades with a clear end use sector and a distinctive manufacturing technology. The fourth group includes all the rest of the various uncoated groundwood grades.

1. Category I: Supercalendared Papers

   This, mainly European based grade, has high filler content and competes mainly with LWC paper. This grade represents the highest quality uncoated groundwood paper.

2. Category II: Lightweight Groundwood Papers

   Into this category fall all the unfilled uncoated groundwood grades with basis weight less than that of standard newsprint (48 g/m^2). In the main end use sector, telephone directories, there are no major competing grades to lightweight uncoated groundwood papers.

3. Category III: Groundwood Business Forms

   The main end use area of the uncoated groundwood forms is the computer printing industry. Uncoated freesheet is the main competing grade in this market sector.

4. Category IV: Other Uncoated Groundwood Papers

   This category includes all the uncoated groundwood grades not fitting in to the previous categories. The main tonnage is improved news (supernews, rotonews, etc.), which is competing on the same end use markets with standard newsprint and low quality SC-paper. Also the bulky book paper, which is used in pocket books and comics, is included into this category.

In Western Europe, uncoated groundwood (i.e woodcontaining) papers are divided into two main categories based on the used manufacturing technology:

- SC-papers (Supercalendared)
- MF-papers (Machine Finished)

These two group are further split into smaller subgroups, e.g SC-paper is divided into SC-offset and SC-gravure.

In Japan uncoated printing and writing papers are classified according to the end uses and chemical pulp contents.

Table T.4.1. Uncoated Printing and Writing Paper Classification in Japan

Name of the Grade	Chemical Pulp Percent	End Uses	Corresponding North American Grade
Printing paper A	100	Books, offset printing, posters, commercial printing	Freesheet
Printing paper B	70-99	Books, magazines, office uses	Freesheet
Printing paper C	40-69	Magazines, telephone directories, business forms	Improved news Business forms SC-papers
Printing paper D	0-40	Magazines	
Gravure printing paper	0-40	Rotogravure printing	SC, Rotonews
Senka printing paper	0-40	Comics, paperback books	Bulky papers
Other printing papers	70-100	Dictionaries, security papers, special printing	Freesheet
Writing/drawing papers	70-100	Writing and drawing papers	Freesheet
Gate-roll coated paper	40-100	Textbooks, brochures magazines, commercial printing	Pigmented groundwood

4.2.2 Uncoated Groundwood Paper End Uses

Practically all of the uncoated groundwood paper is used for printing and writing purposes. The printing and writing papers on the other hand include a wide variety of products ranging from newsprint and bulky groundwood paper used in paperback books to high rag-content bond used for bill printing. They also include converting papers such as envelopes, tablets and business forms. The structure of printing and writing paper industry is illustrated in Figure F.4.4.

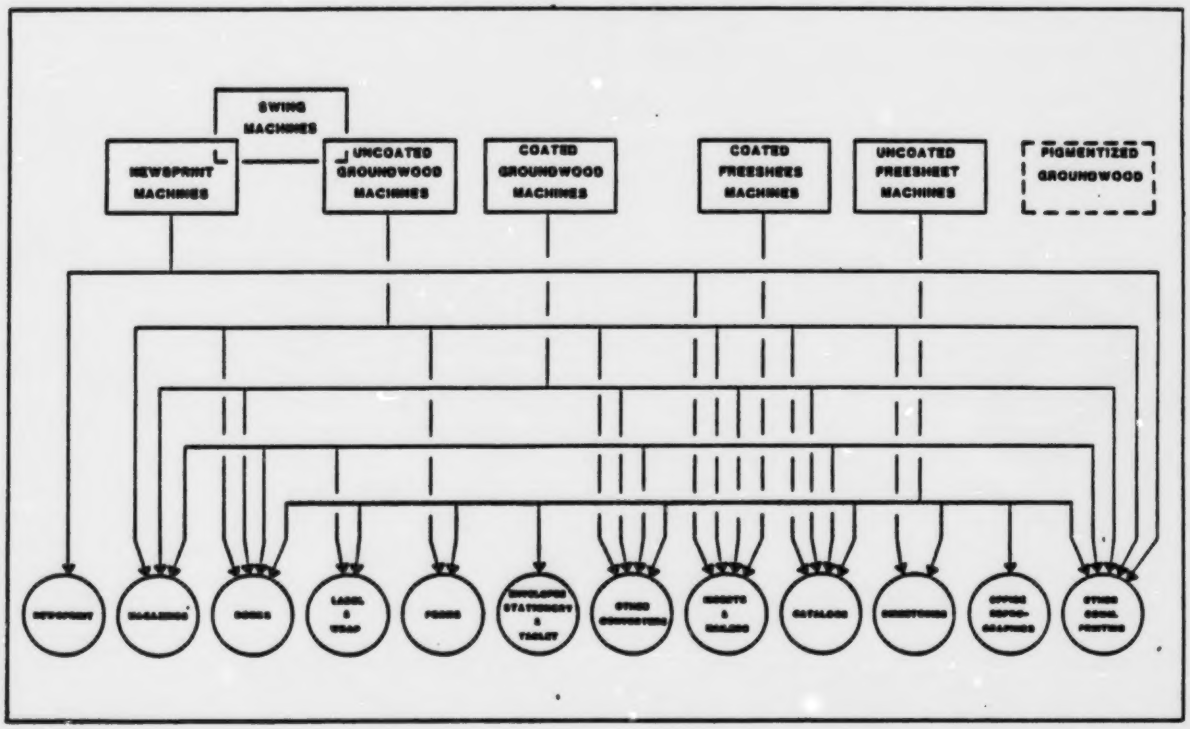

SWING MACHINES
NEWSPRINT MACHINES
UNCOATED GROUNDWOOD MACHINES
COATED GROUNDWOOD MACHINES
COATED FREESHEES MACHINES
UNCOATED FREESHEET MACHINES
PIGMENTIZED GROUNDWOOD
BOOKS
LABEL & WRAP
FORMS
STATIONERY
CATALOGS

Figure F.4.4. PRINTING AND WRITING PAPER PRODUCERS AND END USERS

The lowest quality paper in these markets is basically standard newsprint . About 75% of it is used in daily and weekly newspapers, the balance being used mainly in inserts and mailers.

Most of the lower quality uncoated groundwood paper (rotonews, bulky papers, etc.) machines originally made standard newsprint and later were upgraded to produce groundwood specialties, as they ceased to be competitive in the newsprint industry. These machines are called "swing-machines", because they are able to swing between uncoated groundwood paper and standard newsprint depending on the present market demand situation. Currently the swing capacity is estimated to be about 3 million tons, according to API and most of that capacity is located in Canada.

In coated groundwood papers, the fiber furnish contains more than 10 percent mechanical pulp (usually 50 percent mechanical, 50 percent chemical). The two-sided coating represents about 30 percent of the total weight of the finished paper.

As a remark both uncoated and coated freesheet represent the highest quality printing and writing papers. The contents of mechanical pulp in these grades is lower than 10 percent. The European term "woodfree" corresponds to the North-American "freesheet" grade.

The main end use markets for uncoated groundwood papers are magazines, books, business forms, other converting, inserts and mailers, catalogs, directories, and other commercial printing (see Figure F.4.4.).

NORTH AMERICAN MARKET END USERS

MAGAZINES

In 1986, U.S. magazine printers consumed about 2.5 million tons of paper and were the second largest user of printing and writing papers. The main economic end use indicator in the magazine publishing industry from the paper demand point of view is the number of advertising pages. This has been closely correlating with the paper demand in the magazine industry after making adjustments for basis weight changes. The major driving force behind the long term growth of the magazine industry is the growth in the number of households in the U.S. which will be stagnating in the late 90's after the baby-boom portion of the population has aged beyond the household formation ages.

The paper demand in the magazine sector will grow about 3.2 percent/year on average to year 2000, when the tonnage is estimated to reach 4 million tons. The main factors behind this growth are:

* Increased advertising
  ** growth in advertising 3.5 percent/year
  ** higher level of disposable income
  ** increasingly competitive nature of consumer goods markets
  ** the growth of international trade generally with imported goods seeking to establish positions in foreign markets.
  ** Prime-time TV advertising is expensive
  ** TV's prime-time is short
  ** Magazine advertising is more directed than TV commercials

- The number of special interest magazines will grow faster than that of general magazines
  - Increased circulation figures
  - More advertising due to the directed markets

Presently, it seems that the new electronic media will not have any major effect on the magazine markets until year 2000.

Another clear trend in the magazine markets is the development towards higher paper quality. The reasons for this can be found both in the technical development in the printing industry and in consumer habits:

- As previously stated, the growth of general magazines will be lower than the growth of special magazines and traditionally there is a higher paper quality in special magazines.

- The lower circulation of the special magazines and the requirement for flexibility in printing processes will increase the use of offset paper on the cost of gravure. Again, in offset-printing the paper quality requirements are higher than in gravure printing.

As a result of the estimated trends, the fastest growing paper segment in the magazine sector will be high quality SC-offset and LWC-offset paper, both of which could offer good offset print-quality.

Currently both SC- and other (improved news, etc.) uncoated groundwood grades are used in magazines. The demand of SC-paper for magazines was in 1985 about 200,000 tons, which represents 8.1 percent of the total paper demand in the magazine printing. Due to the higher quality requirements the share of SC-paper is estimated to grow by the year 2000 to about 13.5 percent of total, which corresponds to a SC-paper demand of 550,000 tons. At the same time the lower quality uncoated groundwood demand is estimated to decrease from the current 100,000 tons/year level to about 60,000 tons by the year 2000 (Figure F3.5).

The main competitor to uncoated groundwood (SC-paper) in the magazine paper segment is LWC-paper.

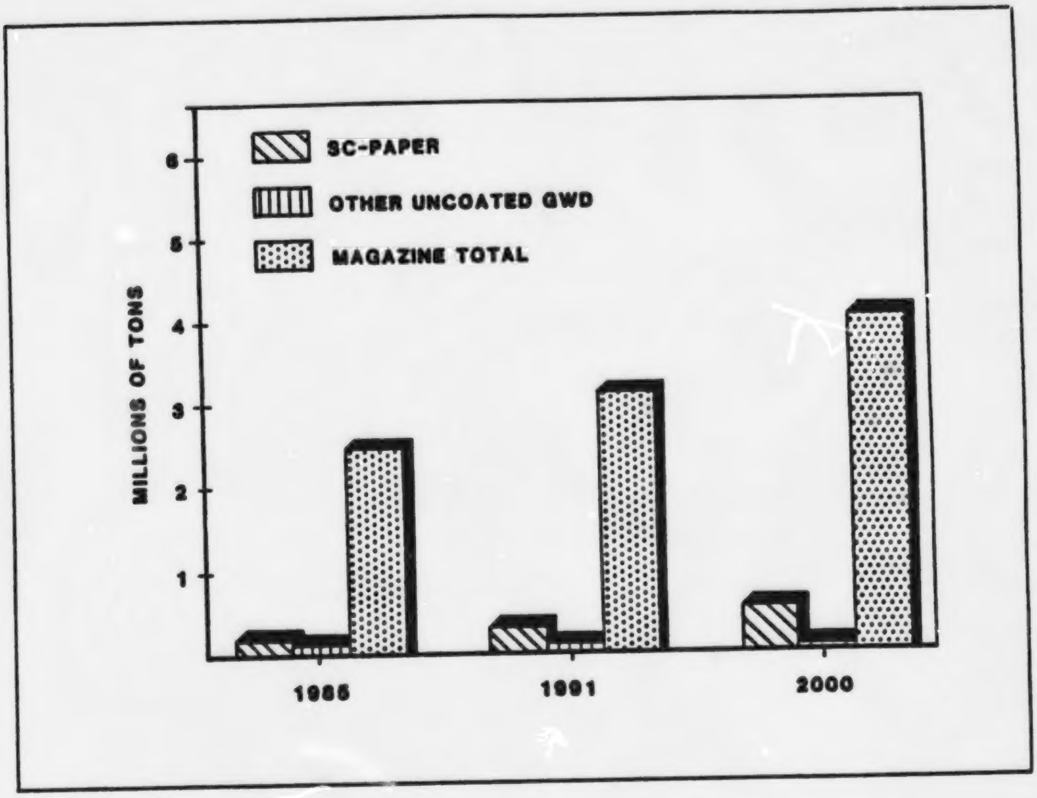


Figure F.4.5. UNCOATED GROUNDWOOD CONSUMPTION IN MAGAZINES

BOOKS

The book printing end use market, 0.95 million tons in 1985, is dominated by uncoated freesheet (market share 50 percent). The growth in the book sector is estimated to be 300,000 tons or 1.8 percent/year by year 2000. The main reasons to the fairly low growth in the book industry are:

- The percentage of population in school ages is decreasing.
- The average basis weight of the paper used in books is decreasing.

A continuation of the very low growth in the paperback book sales and improved efficiency in the high return of paperback books will keep the uncoated groundwood demand at the book end use markets at the current 230,000 tons per year level (Figure F.4.6.).

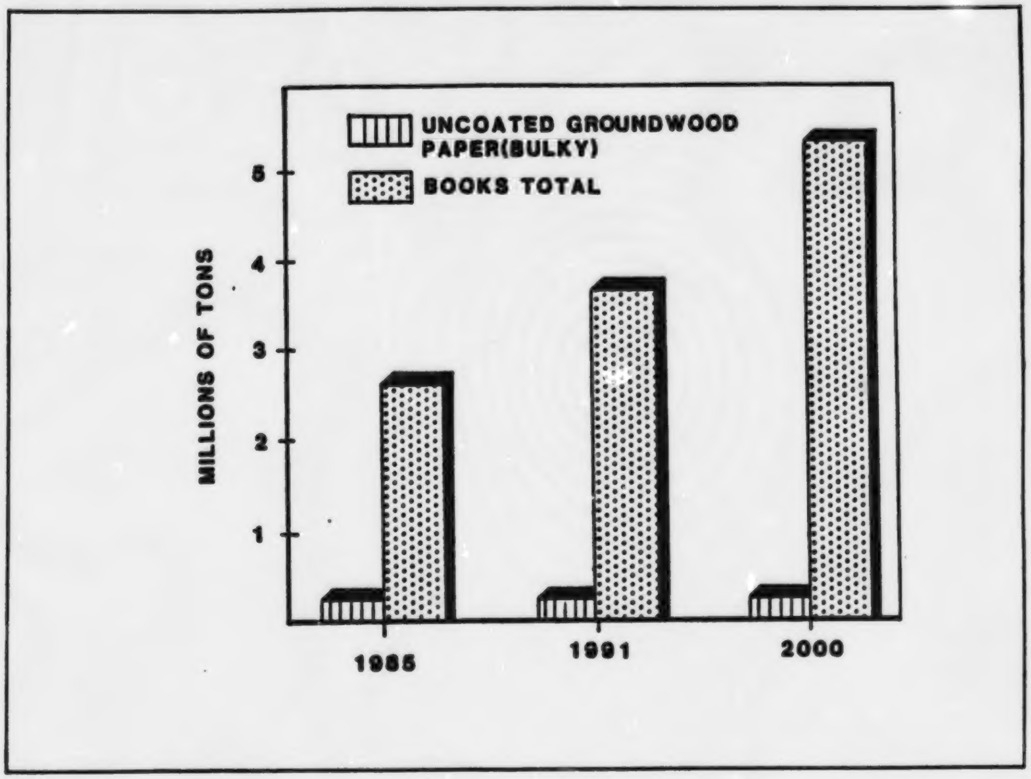


Figure F.4.6. UNCOATED GROUNDWOOD USAGE IN BOOKS

BUSINESS FORMS

In 1985 the business forms industry consumed about 2.6 million tons of printing and writing paper consuming 2.3 million tons uncoated freesheet and 0.3 million tons uncoated groundwood. Business forms sales should continue to exceed the rate of growth in gross national product by a wide margin, but the 6.6 percent annual growth during the past decade will probably not be sustained. We have estimated that the sector will grow 4.8 percent/year on average and the tonnage will reach 1.3 million tons in 2000 (Figure F.4.7) The new markets assisted with the mini and micro computers and the new non impact printing technology will be the main driving forces behind the growth of the forms industry.

The growing use of non impact laser printing will raise the average basis weight of forms paper, but it will cut down the use of carbon interlining thin paper or carbonless paper. The overall impact of non impact printing on paper shipments to the forms industry will be positive and will be raising the average basis weight and lowering the cost of high-volume forms printing.

The main quality disadvantages of the groundwood forms are the tendency to loose dimensional stability and the tendency of colour reversion. That is also the reason, why uncoated groundwood forms are currently used mainly in short-living-time internal reporting.

By taking the above mentioned factors into consideration, we have estimated that the groundwood forms will increase their market share in the business forms industry from the current 12.6 percent to about 17 percent by the end of this century.

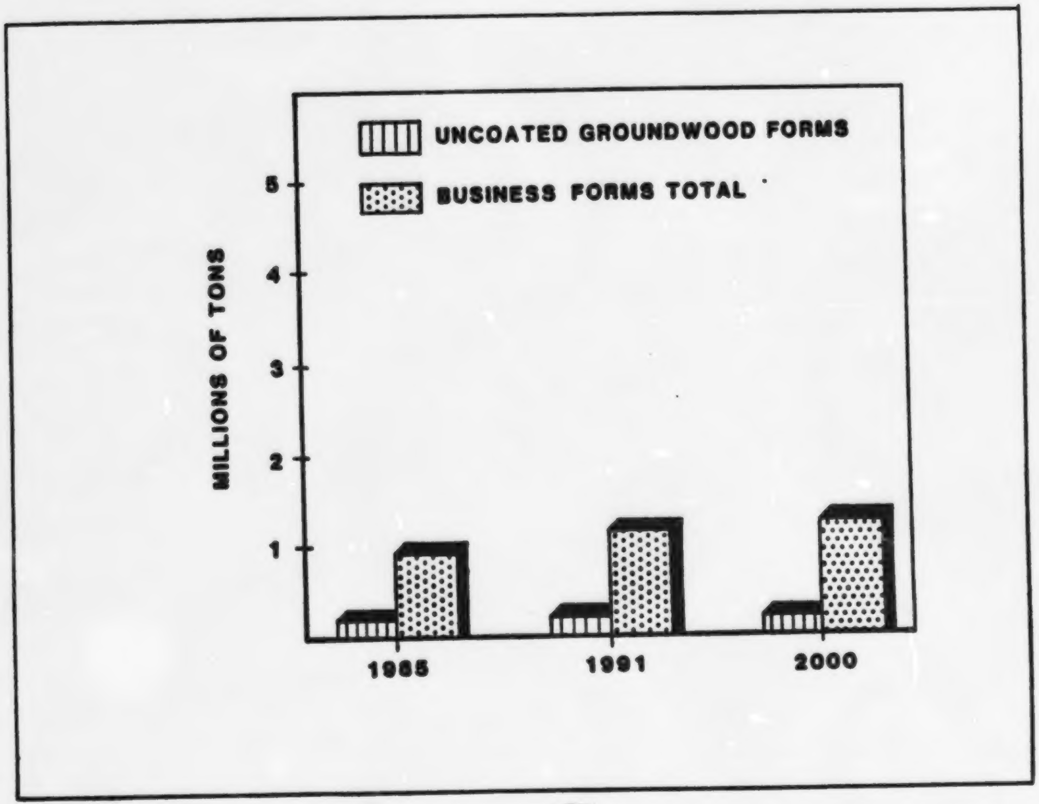


Figure F.4.7. UNCOATED GROUNDWOOD USAGE IN BUSINESS FORMS

OTHER CONVERTING

This category includes shipments to converters which do not fall into the previous categories of forms, envelopes, or stationary and tablet converters. Converters that fall into this category include for example: check printers, gummed paper converters, foil laminating, gift wrap, adding machine roll converters, wallpaper converters.

In 1985 the shipments to these converters were about 670,000 tons in U.S., of which uncoated and coated freesheet provided for than 80 percent.

As a potential uncoated groundwood consumer, this category is of less importance - current consumption totalling 60,000 tons/year of various uncoated groundwood grades.

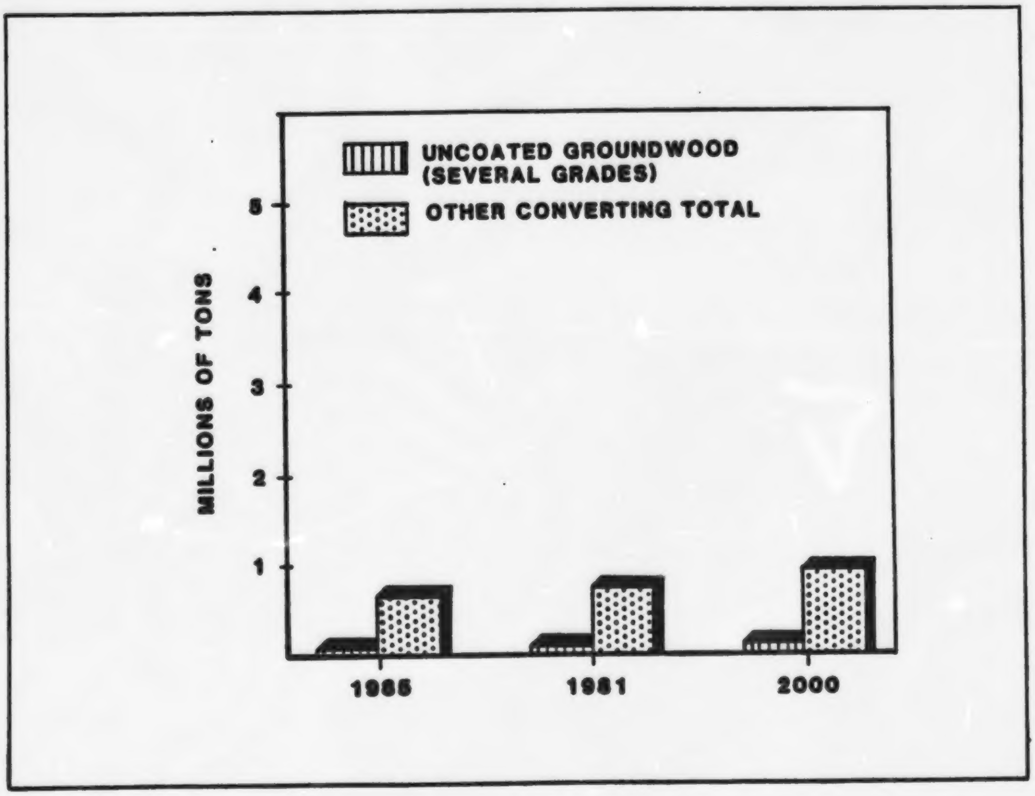


Figure F.4.8. UNCOATED GROUNDWOOD USAGE IN OTHER CONVERTING

DIRECTORIES

The directory markets are dominated by lightweight uncoated groundwood paper, which represents currently about 88 percent of the total paper demand. The remaining 12 percent is uncoated freesheet, the share of which is estimated to be decreased to 8 percent by the year 2000 due to the better cost competitiveness of groundwood papers.

The growth of white pages in the telephone directories follows closely the growth in U.S. households, which is estimated to be low (1.3 percent/year) for the rest of this century. Yellow pages and special directories are expected to grow much faster during the next few years due to the growth in advertising pages. It is also presumable that electronic media will begin to play an important role in the directory sector in the late 90's. For example in France electronic telephone catalogs are already in use. The orders of telephone directory paper are normally huge (hundreds of thousands of tons) and the big order quantities have created a situation where the competition in the sector is very tough.

We estimate that the growth in the directory paper demand will be 1.8 percent/year on average to the year 2000. Because lightweight uncoated groundwood could increase its market share by year 2000 to about 92 percent, the tonnage will increase from 520,000 tons in 1985 to about 710,000 tons in year 2000 (Figure F.4.9).

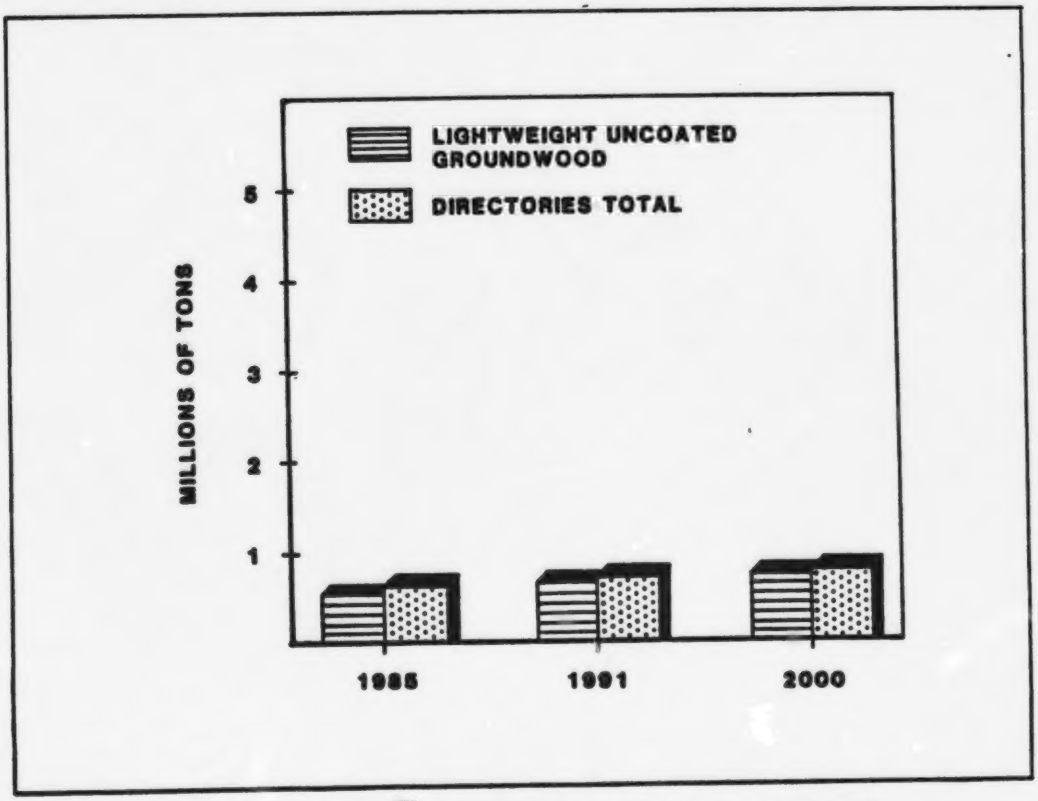


Figure F.4.9. UNCOATED GROUNDWOOD USAGE IN DIRECTORIES

CATALOGS

In the present study the catalogs are defined to be printed products specifically designed to promote sales of products and services. In 1985 the total paper demand in the catalog industry was about 1.65 million tons, the uncoated groundwood share of which was 29 percent or 480,000 tons; 10.5 percent SC-paper, 18 percent lightweight and 0.5 percent other uncoated groundwood grades.

The use of off-shore imported paper in the U.S. catalog industry is remarkable, about 200,000 tons in 1985. The most sizeable penetration rate appears to be with SC-papers, where as much as 60 percent of the demand is coming from off-shore suppliers. The main reason for this being the high quality of European SC paper.

The growth of the catalog industry was extremely fast in the late 70's and early 80's, the average growth rate being more than 14 percent annually. Although the growth of the sector will slow down during the rest of this century due to saturation of large general catalog markets. However, the fast growth experienced by the specialized mail order companies with fairly small catalogs should keep the growth rate at about 4.1 percent.

The growth of special catalog markets will also substantially influence the paper quality trends. Offset-printing, which requires high quality paper, becomes less expensive compared to gravure, when the number of copies is less than about 500,000. It is evident that the reduced circulation and the use of offset-technology as well as the need of better appearance in the final product increases the demand of high quality paper grades.

In addition to the importance of high quality printing properties, the low basis weight is important due to the high mailing costs. Especially in Europe the trend towards ultra light weight grades, basis weight less than 45 g/m^2 is evident. (Haindl 40 g/m^2).

We do not assume a major effect from electronic media in the catalog industry through this century.

We have estimated that the share of uncoated groundwood paper used in the catalog industry will drop from the current 30 percent level to about 25 percent at the end of the century. However, the use of SC-grade will increase from the current 10.5 percent to 11.5 percent mainly on the expense of lightweight uncoated groundwood. In tonnage terms the SC-paper demand should grow from 110,000 tons/year to about 350,000 tons (Figure F.4.10).

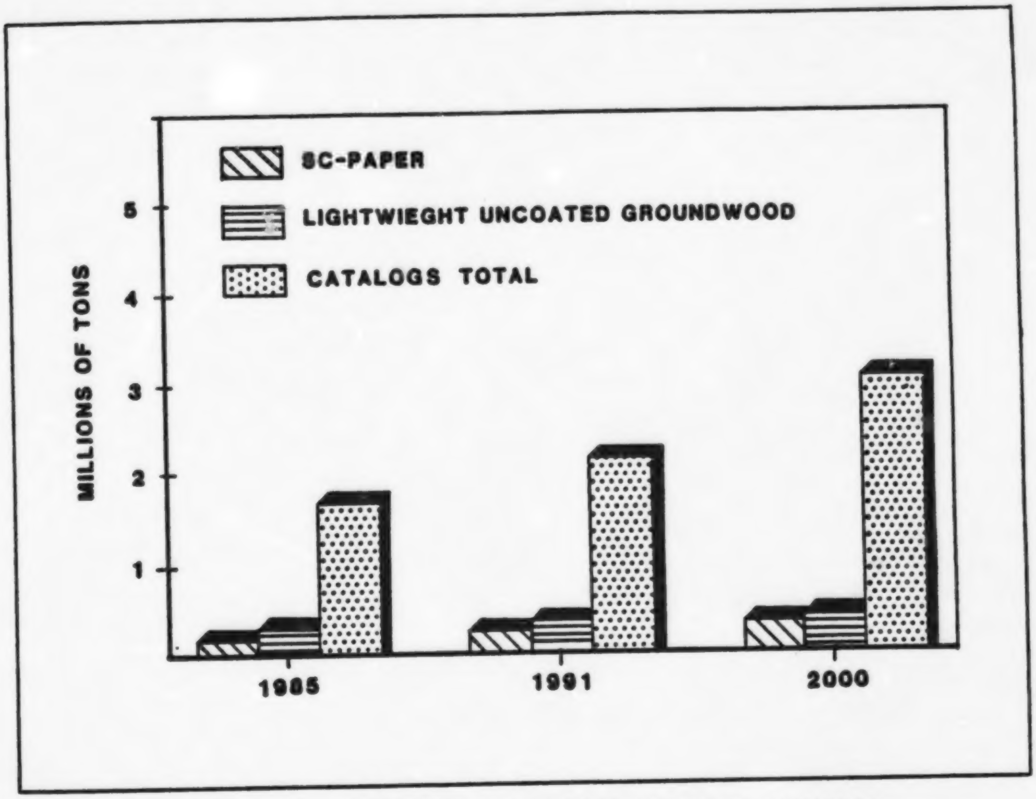


Figure F.4.10. UNCOATED GROUNDWOOD USAGE IN CATALOGS

INSERTS AND MAILERS

The insert and mailer market includes both inserts that are distributed in newspapers and those mailers that are delivered directly through mail or total market coverage programs. The tonnage of inserts and mailers was in 1985 1.1 million tons, of which almost 50 percent or 550,000 tons was uncoated groundwood paper; 18.5 percent SC and the rest mainly improved newsprint. The average annual growth of the insert and mailer industry reached 13 percent in the 70's and early 80's but is expected to grow at a lower average annual rate of 4.4% from here on to the end of the century.

The growth in the insert/mailer industry will vary greatly by segment. The food advertising inserts will be the lowest growth market while the fastest growing segment will be the special store insert business. Correspondingly internal restructuring of the insert/mailer industry is recognized in the paper quality requirements of the industry. Food advertising inserts are generally printed on newsprint or on improved newsprint while in special inserts and mailers high quality uncoated groundwood and coated groundwood papers dominate the markets.

We estimated that the share of SC-paper would remain at the current 18.5 percent level while the share of other uncoated groundwood grades, mainly improved news, will drop from the current 30 percent to about 20 percent (Figure F.4.11). The biggest winner will be the LWC-paper, which will increase its market share from 42 percent to 58 percent by year 2000.

In the insert and mailer industry the share of off-shore imports is remarkable, about 23 percent in 1985. Of the SC-paper consumption within the segment the share was even higher - slightly over 50 percent.

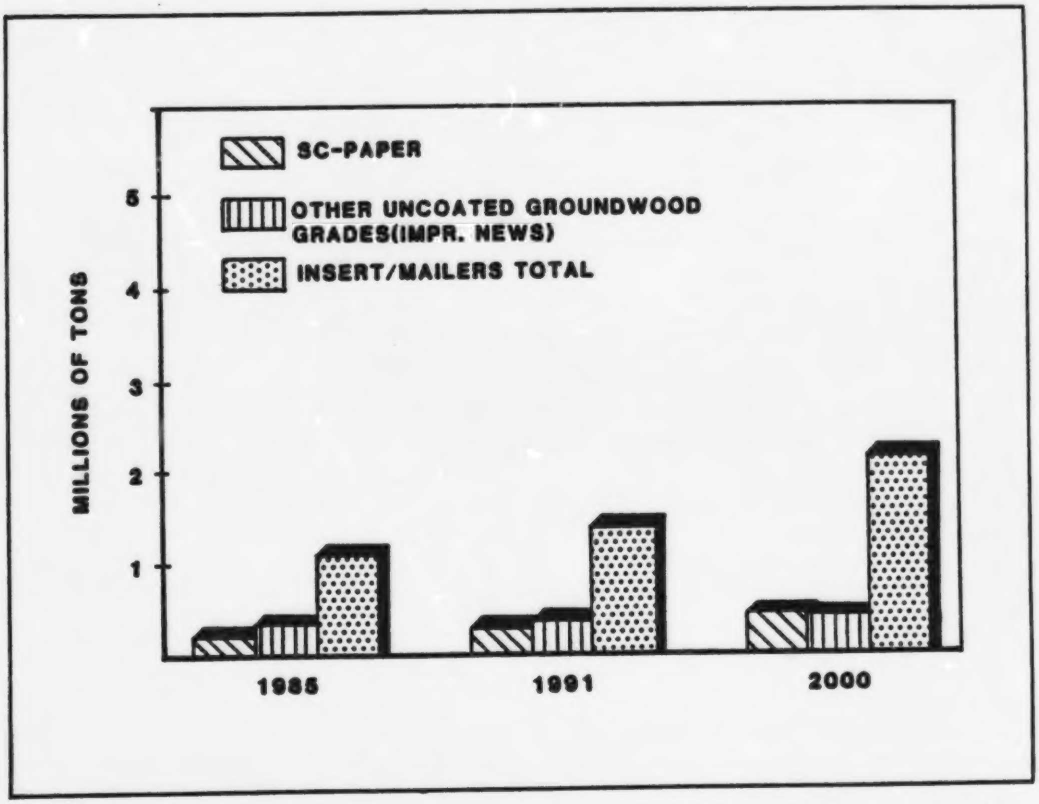


Figure F.4.11. UNCOATED GROUNDWOOD PAPER USAGE IN INSERTS AND MAILERS

OTHER COMMERCIAL PRINTINGS

The category includes shipments of all printing and writing paper to commercial printers, which do not fall into the previous categories of directories, catalogs and inserts/mailers. Typical subgroups of this category are: annual reports, travel brochures, printed tablets, Sunday supplements, etc.

The shipments within the category were in 1985 about 3.7 million tons, which makes it the largest single user of printing and writing papers. It is also obvious that commercial printing industry will continue to be a high growth market due to the expected good performance of the printed media advertising. However, the growth rate will be lower compared to that of catalogs and inserts/mailers. This category is also very diversified and the growth rates vary extensively by segment.

We estimate that "other commercial printing" market will grow by an average annual rate of 3.2 percent during the rest of the century. In tonnage terms this corresponds to an increase from the current 3.7 million tons per year to almost 6 million tons in year 2000. Looking at the uncoated groundwood paper, SC-paper will loose markets to coated papers and the market share will drop from 3.6 percent to 3.4 percent. However, the total SC-paper demand will most likely increase from the current 135,000 tons to about 200,000 tons per year.

The market of other uncoated groundwood grades is currently about 2.7 percent and will decrease to about 1 percent by year 2000. Although a high printing and writing paper total demand, the sector is not a substantial potential consumer of uncoated groundwood paper in the future (Figure F.4.12).

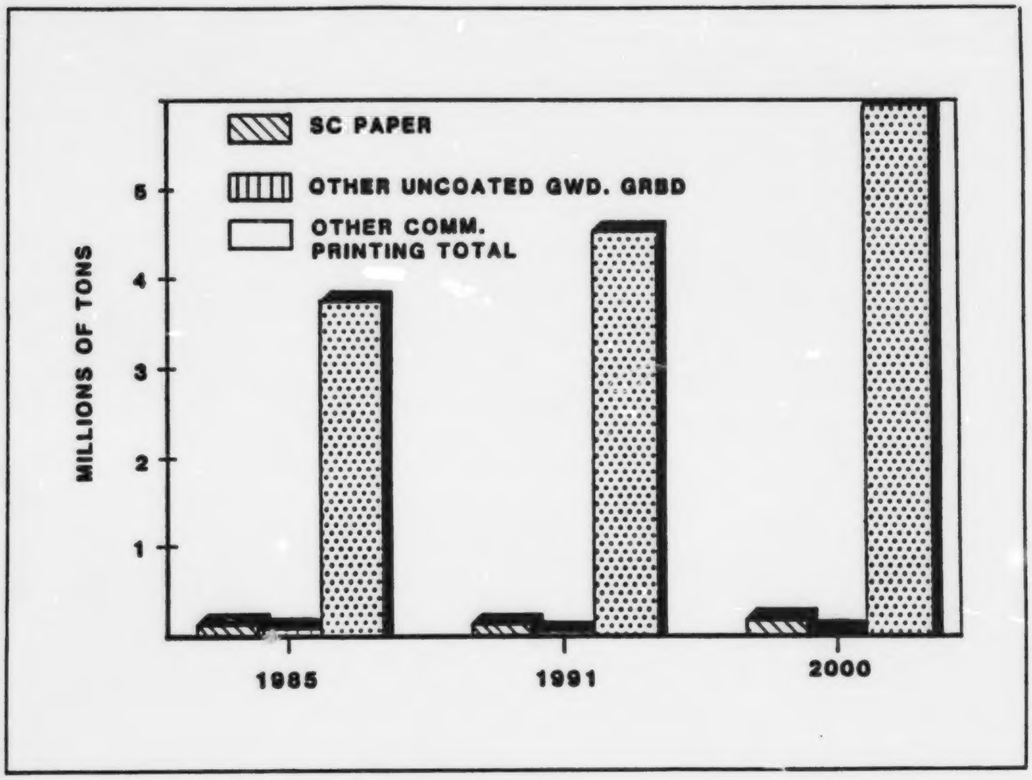


Figure F.4.12. UNCOATED GROUNDWOOD USAGE IN OTHER COMMERCIAL PRINTING

SUMMARY OF UNCOATED GROUNDWOOD END USE MARKETS IN THE U.S.

The total uncoated groundwood paper demand will grow from 2.7 million tons in 1985 to about 4.5 million tons in the year 2000, which corresponds to a growth rate of 3.3 percent/year. We have estimated the breakdown of the growth as follows:

Grade	Current 1000 tons	Growth Percent/year
SC-paper	780	5.0
Lightweight Groundwood Paper	300	2.1
Groundwood Forms	580	7.0
Other	90	0.7
TOTAL	1750	3.3

The highest percentage growth, 7 percent will be experienced in groundwood business forms. Also the tonnage growth is remarkable, the capacity of at least three large papermachines totally.

The high quality combined with the fairly high growth rate and the diversification of the end uses seems to give the best opportunities from the market point of view for production of SC-paper grades.

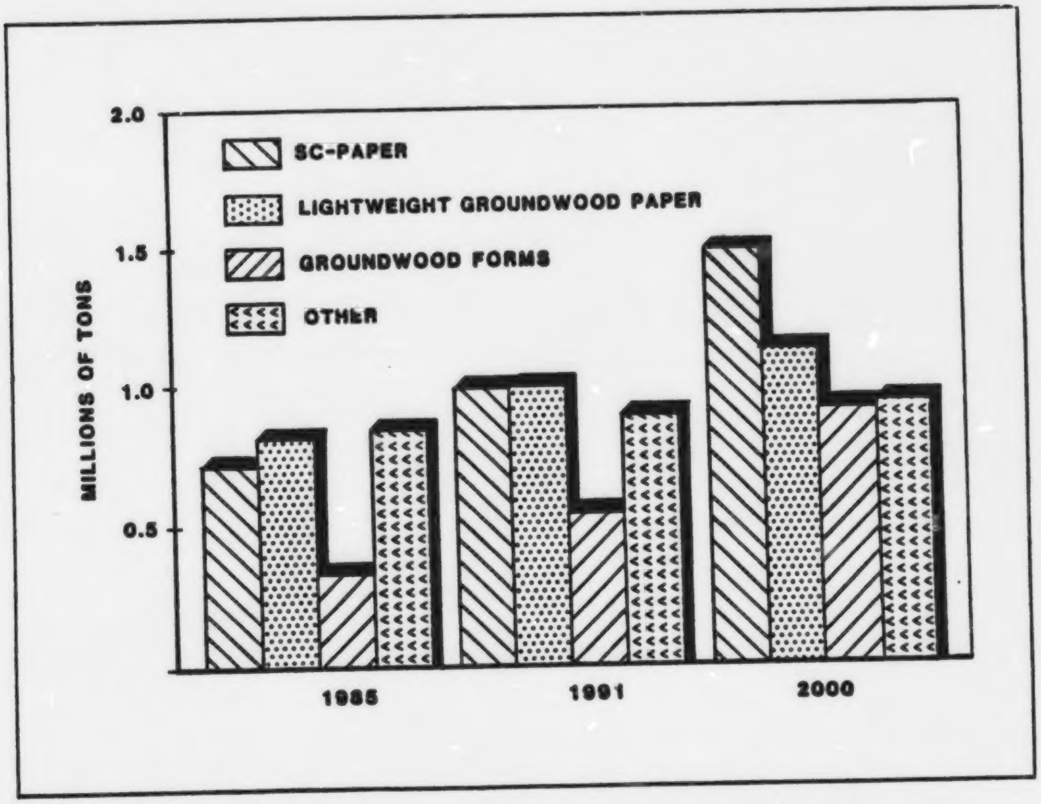


Figure F.4.13. BREAKDOWN OF GROWTH IN UNCOATED GROUNDWOOD PAPER DEMAND GROWTH

PACIFIC RIM MARKET END USERS

Uncoated groundwood papers are not categorized similarly in the Pacific Rim countries as in North America. This is mainly due to the vast variety of both uncoated groundwood and uncoated freesheet paper grades produced in these countries.

The total uncoated groundwood consumption in 1985 is estimated to be as follows:

	1000 tons
Japan	1640
Rep. of Korea	160
People's Rep. of China	160
Total	1960

Supercalendared paper end use markets are easier to analyze than that of uncoated groundwood. In Japan the end-use markets can be divided into three separate categories: magazines, catalogs/mailers/inserts and other markets. The magazine end-use sector represents currently about 50 percent of the total SC-paper consumption in Japan. This represents about 80,000 tons annually. The advertising business consumes about 30 percent of the total or 50,000 tons/year and the other miscellaneous end users about 20 percent or 30,000 tons of the total SC-paper demand.

The current SC-paper consumption level in the Republic of Korea and in the People's Republic of China is extremely low compared to North American or European figures, only about 1000 tons per year. The main SC-paper consuming industry in these countries is the magazine publishing, especially export oriented magazines.

The SC-paper demand in the Pacific Rim countries is forecasted individually for each country in Section 4.2.8.

4.2.3 SC-Paper Classification

There is no industry wide standard to classify supercalendared papers. In North America the most common method is to divide them into two subcategories: SC-A and SC-B grades. The filler content in SC-A-grade is 15-30 percent and the brightness 66-80 and an extra surface treatment is included to improve the printing properties of the paper. The highest quality SC-A grade is currently imported to the U.S mainly from Central Europe (Table T.4.2). SC-A is moreover divided into SC-offset and SC-gravure grades, from which the SC-offset is the higher quality grade (e.g. Myllykoski, Metsä-Serla WSOP).

SC-B grade is produced mainly in Canada and its filler content is normally less than 15 percent and brightness lower than that of SC-A grade.

In the most recent classification system (Mr. Ruggles, Richard Lewis Paper Co., Chicago) SC-papers are divided into five categories according to their brightness level. This classification is analog to the classification systems of coated papers. In Table T.4.2 hereunder, some of the main SC-producers and main competing grades are tabulated based on this classification system.

In Western Europe, Standard SC corresponds to the North American SC-A-grade and Modified SC to the SC-B.

Table T.4.2. Classification of SC-Papers

	GE Brightness	Main Producers/Importers		Main Competitors
		#1	Albruck, Germany	Coated #3, #4 Pigment. freesheet
			Carmignao, Italy	MF #1
	80			
SC-A				Coated #4, #5 Pigment. freesheet
(Standard SC)		#2	Albruck, Germany	MF #1, #2
- offset - gravure	75			
		#3	Finnpap, Finland Champion, USA	Coated #5 Pigment. groundwood MF #1, #2
	70			
		#4	Finnpap, Finland Madison, USA	Coated #5 Pigment. groundwood MF #1, #2, #3
	65			
			CIP, Canada	
SC-B				
		#5	Kruger, Canada St. Mary's Paper, Canada	MF #2, #3, #4
(Modified SC)				

4.2.4 World SC-Paper Demand/Supply

SC-paper is still mainly an European grade and is produced especially in the Federal Republic of Germany and in Finland (Figure F.4.14). Currently the North American consumption, about 700,000 tons per year, doubles the North American capacity. The remarkable off-shore imports of high quality SC-paper could give good opportunities for potential Albertan producers to penetrate the North American markets.

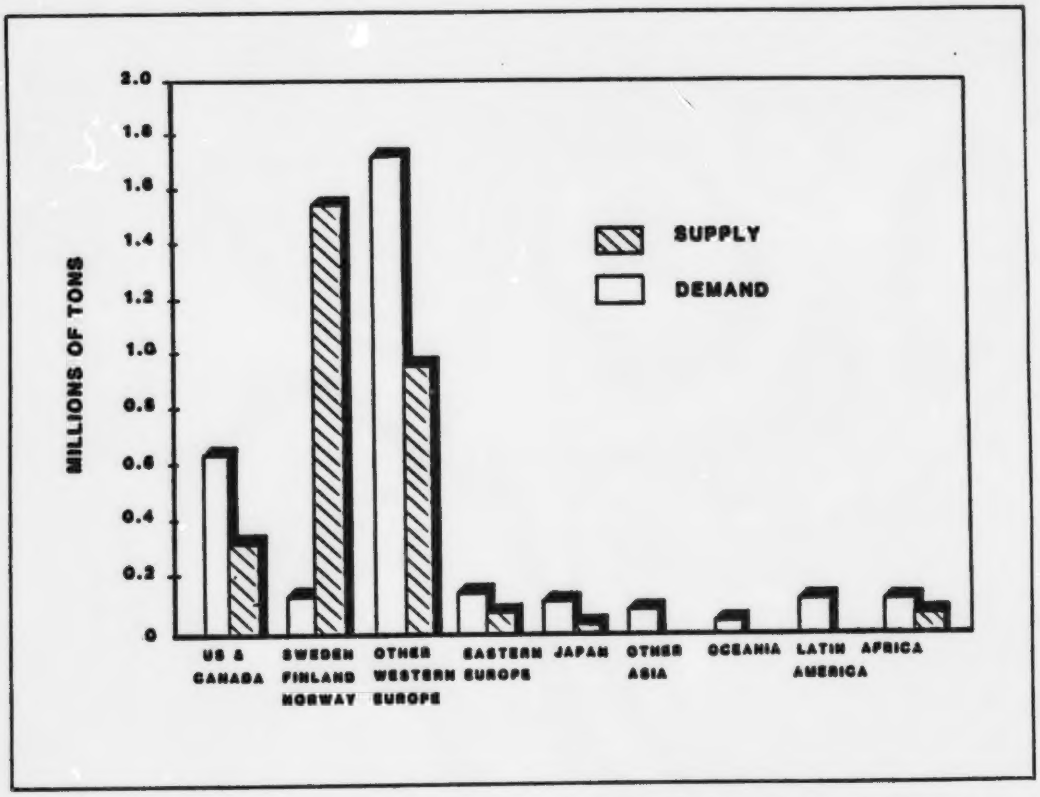


Figure F.4.14. WORLD REGIONAL SC-PAPER DEMAND AND PRODUCTION

It is also important to recognize that SC is a value added paper grade that is consumed mainly in the developed countries i.e. Western Europe and North America. The demand figures for South East Asia clearly indicates that there is not an established market for SC-grades in the region.

The world-wide consumption of SC-paper is estimated to grow annually about 3.2 percent on average. The demand in Western Europe is already saturated but the growth in the other regions looks fairly healthy (Table T.4.3).

Table T.4.3. SC-Paper Demand Growth Rates

	Current Demand 1000 tons	Percent/year
North America	750	5.7
Japan	160	6.0
South Korea	1	*
China	1	*
Other Regions	2330	1.9
TOTAL	3240	3.2

The world SC-paper capacity in 1986 was about 3.4 million tons as shown in Appendix A.4.1. The already announced or planned capacity additions should increase the capacity by 1992 to about 5.1 million tons. This will cause a remarkable reduction of the capacity utilization in the SC-paper industry as illustrated in Figure F.4.15.

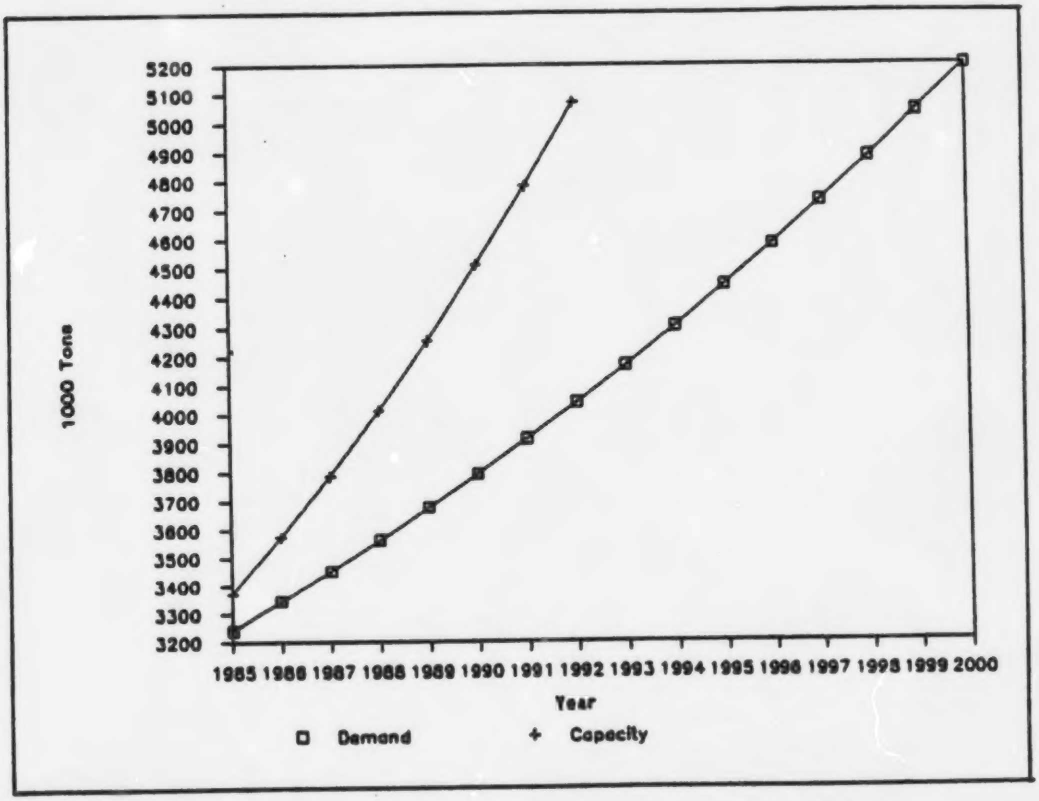


Figure F.4.15. WORLD DEMAND/SUPPLY OF SC-PAPERS

4.2.5 World SC-Paper Trade

The world SC-paper trade is dominated by the Finnish and German companies. Actually those two countries and Norway are the countries together marketing the major part of the worldwide SC-paper (Figure F.4.16).

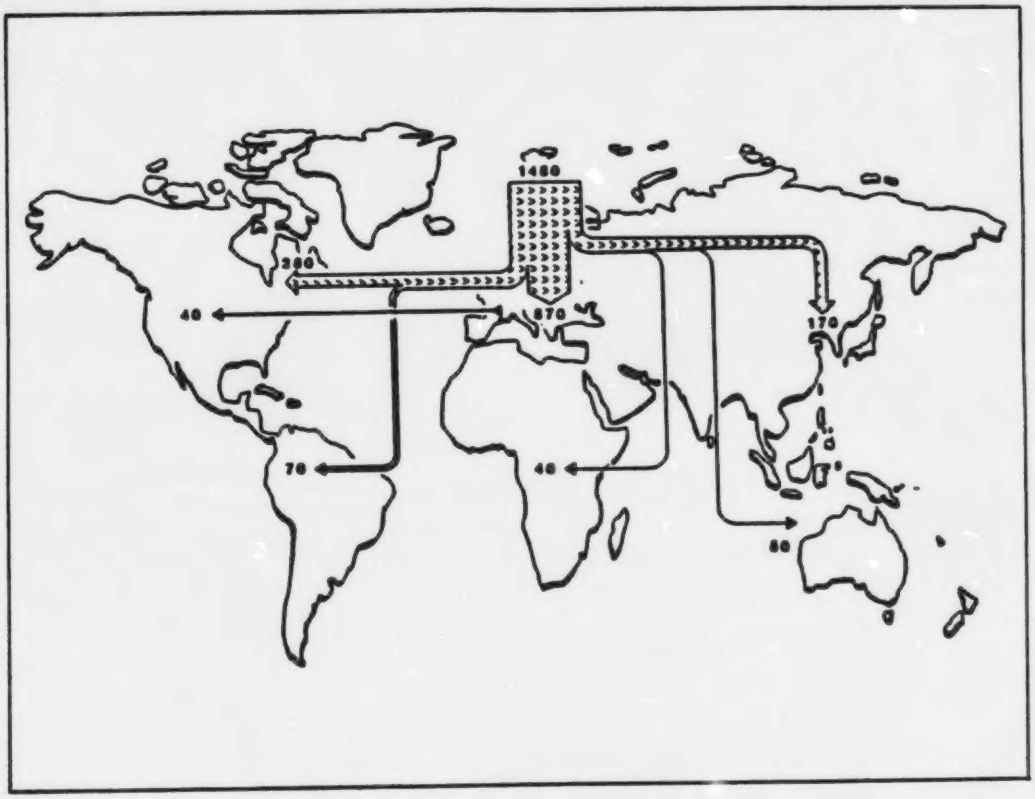


Figure F.4.16. SCANDINAVIAN AND WESTERN EUROPEAN SC-PAPER SHIPMENTS IN 1984

As indicated in Figure F.4.17 the price development of SC-paper could be considered stable during the past few years. The price has also followed closely the changes in price of No. 5 coated paper with a 150 USD/short ton average lower price level. It is, however, predictable that both No. 5 coated and SC-paper price slightly decrease during the next few years mainly due to the overcapacity of both No. 5 coated and SC-papers. This trend has already concretized in SC- and LWC-paper prices.

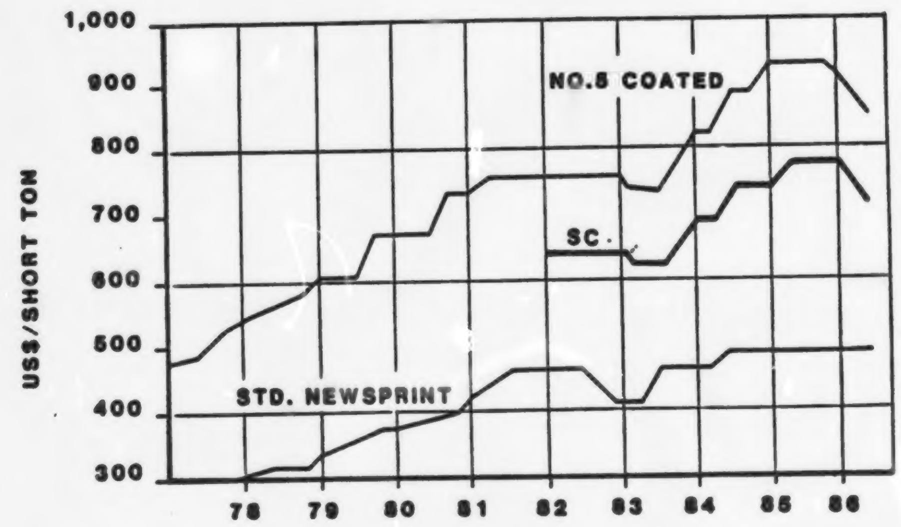


Figure F.4.17. SC-PAPER PRICE DEVELOPMENT

4.2.6 Domestic SC-Paper Markets

In 1985 the SC-paper demand in Canada is estimated to be about 20,000 tons. About 15,000 tons of this was supplied by the domestic producers - CIP Inc., Trois Rivieres and Consolidated Bathurst Ltd., Grande Mere mills - the remaining 5,000 tons being imported mainly from Finland. Since 1985 the Canadian SC-paper capacity (SC-B) has been increased by 130,000 tons; Abitibi-Price, Kenogami No. 6 machine rebuilt in 1985 and

St. Mary's Paper Inc., Sault Ste. Marie, machines Nos 3 and 4 rebuilt in 1985. Currently the Canadian SC-paper (B-grade) capacity, including swing machines, is about 300,000 tons.

The current SC-paper demand in Western Canada is estimated to be only 4,000 tons. This estimate is based on the Western Canadian printing and publishing industries share of the corresponding total Canadian shipments. The SC-paper end use industry is highly concentrated to the provinces of Ontario and Quebec. Ten largest Canadian publishers are all located in Ontario. Seven out of ten largest commercial printers are located in Ontario, two in Quebec and one, Evergreen Press, in British Columbia. Out of the 600 largest Canadian magazines only about 120 are published in the Prairie provinces or in British Columbia.

The SC-paper demand in Western Canada is estimated to grow to 15,000 tons by 1990 and to 30,000 tons by the year 2000. In the future, most of the Western Canadian SC-paper demand will be supplied by the Eastern Canadian producers.

The following Canadian mills have plans to increase their SC-paper production:

- Abitibi-Price Inc., Kenogami, PQ by 64,000 tons in 1987
- CIP Inc., Trois Rivieres, PQ by 30,000 in 1987
- Consolidated-Bathurst Ltd., Grande Mere, PQ by 180,000 (planned)
- St. Marys Paper, Sault Ste. Marie, ON by 135,000 (planned)

Saugbruksforeningen has announced that the 200,000 ton SC-machine project at Matane, Quebec is currently on hold. It is probable that the project will not be realized. There are no plans to start SC-paper production in Western Canada.

4.2.7 Western U.S. SC-Paper Markets

4.2.7.1 U.S. West SC-Paper Markets

There is no current SC-paper capacity nor any announced or planned projects for SC-production facilities in the U.S. West region. The imports from Canada and Scandinavia are slightly more than 30,000 tons/year and supplies are clearly dominated by Finnish producers. The shipments of SC-paper from the other U.S. regions, such as Minnesota, Maine and New York, are estimated to be about 20,000 tons/year The two biggest U.S. suppliers for the U.S. West are Madison Paper Co. and Champion. The total demand, 50,000 tons, in 1985 is surprisingly low compared to other U.S. regions and indicates that SC-paper has not yet penetrated into the market area (Figure F.4.18).

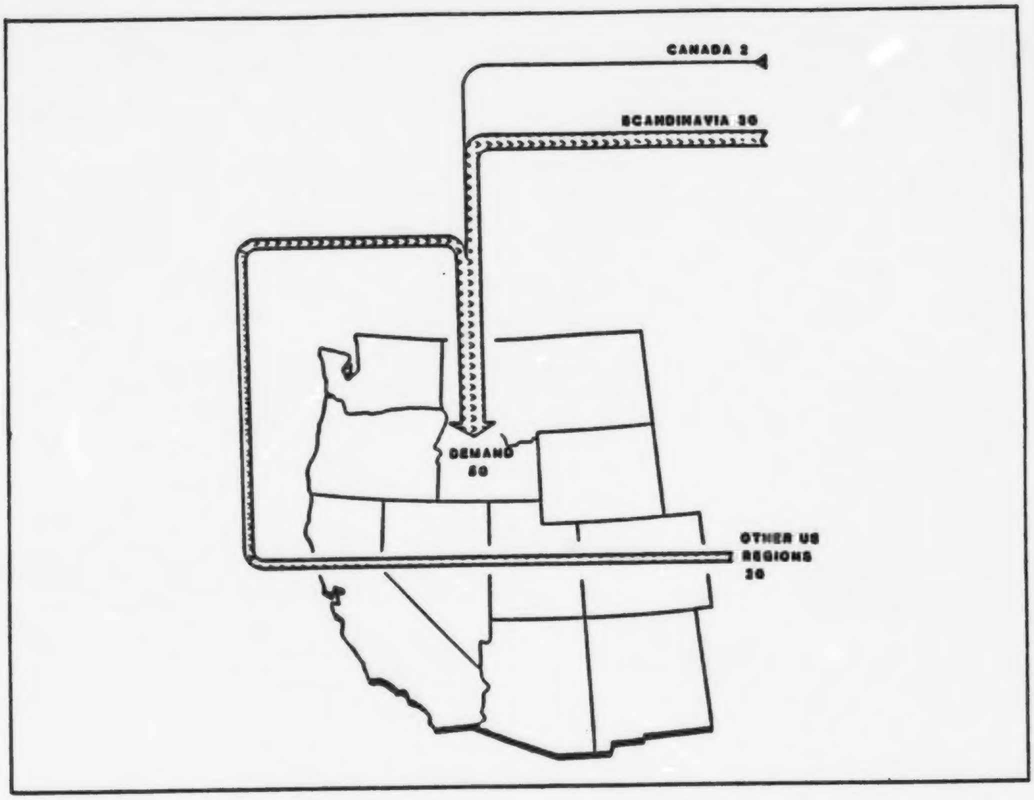

CANADA 2
SCANDINAVIA 30
DEMAND
50
OTHER US
REGIONS
20

Figure F.4.18. ESTIMATED U.S. WEST SC-PAPER DEMAND/SUPPLY STRUCTURE IN 1985.

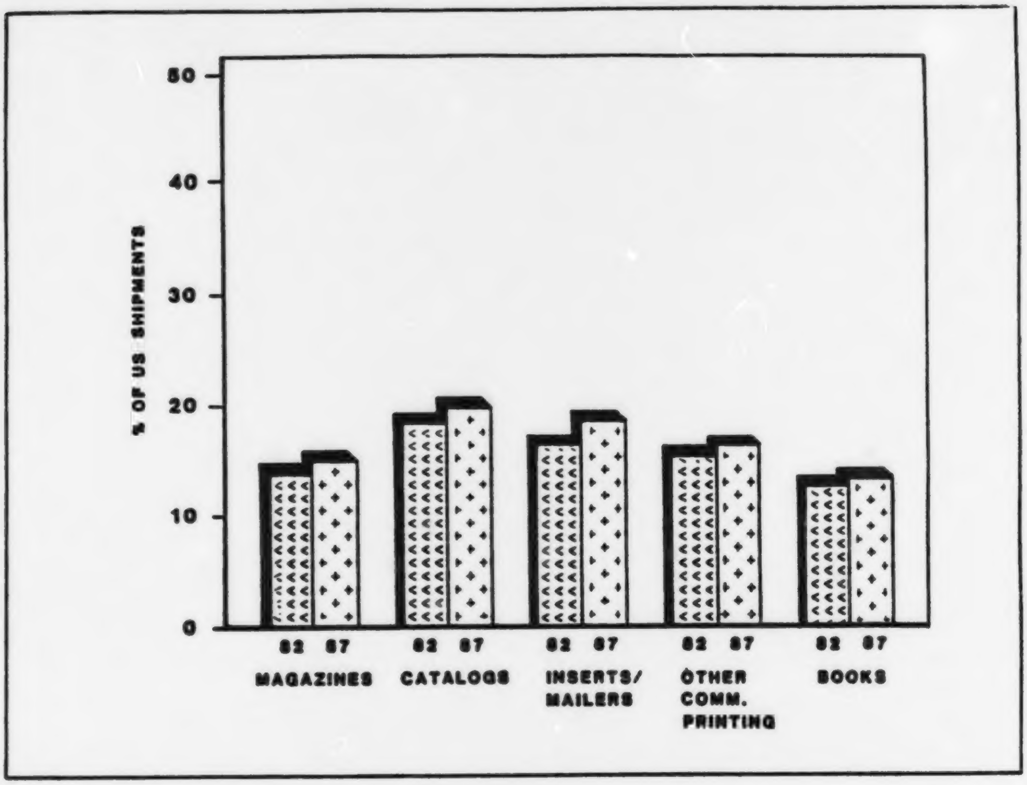


Figure F.4.19. END USE INDUSTRIES SHARE OF THE TOTAL U.S. SHIPMENTS IN U.S. WEST.

We believe that the SC-paper demand in U.S. West is going to grow relatively fast, about 11 percent/year, during the next 15 years. We base our forecast on the following:

* SC-paper will continue to penetrate the U.S. West markets and the share of SC-paper in the printing and publishing industry will reach the U.S. average by year 2000.

* The printing and publishing industry in U.S. West will get a larger share of the U.S. total demand.

* The SC-paper end use industry, magazines, inserts/mailers, and catalogs, will grow comparatively fast during the next 10 years.

The forecasted demand of SC-paper in U.S. West is shown in Figure F.4.20.

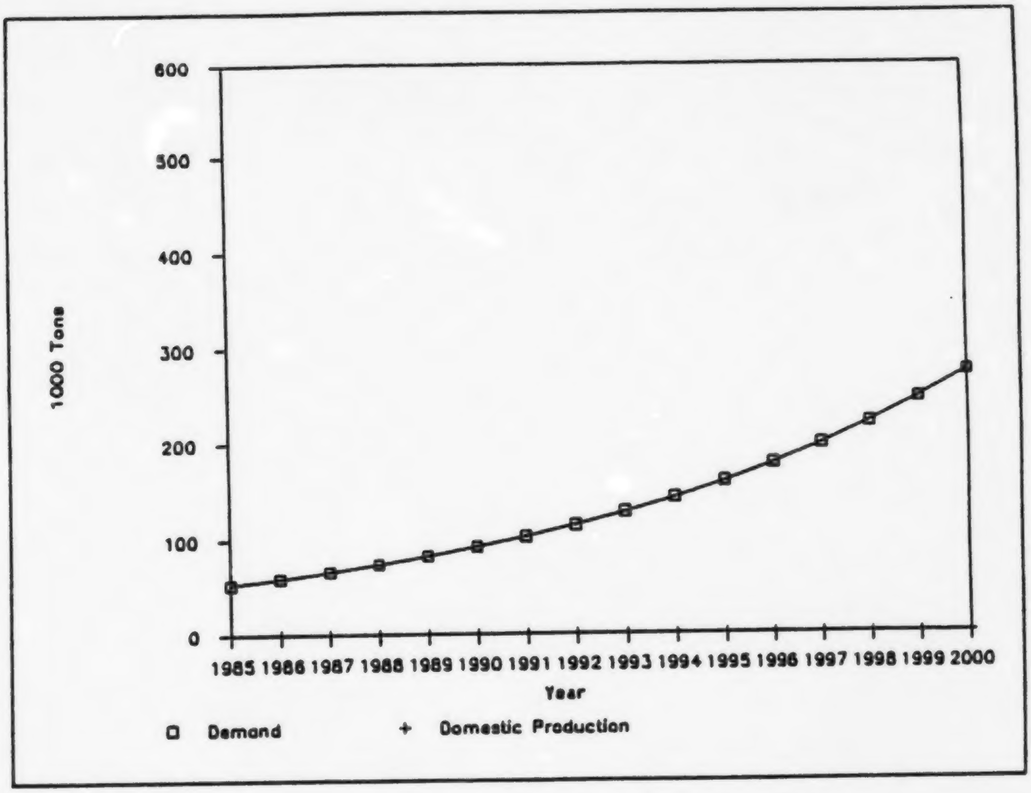


Figure F.4.20. SC-PAPER DEMAND IN U.S. WEST

For a potential Albertan SC-paper producer, the major competitors in U.S. West are Finnpap from Finland (30,000 tons/year) and the U.S. SC-paper producers: Madison, ME, Champion, MN and NY and Lake Superior, MN.

Potential consumers of SC-paper are the major Westcoast printing houses and publishers, a selective list of which are presented in Table T.4.4.

Table T.4.4. Major U.S. West Printers and Publishers

1. W.A. Krueger, Scottsdale, AZ
    * Catalog and magazine printing
2. World Color Press, Merced, CA
    * Catalog printing
3. Carter Hawley Hale, Los Angeles, CA
    * Insert/mailer user
4. Safeway Stores, Oakland, CA
    * Insert/mailer user
5. American Stores Co., Salt Lake City, UT
    * Insert/mailer user
6. Lucky Stores, Dublin, CA
    * Insert/mailer user
7. Cemco Dept. Stores, Dublin, CA
    * Insert/mailer user
8. Price Co., San Diego, CA
    * Insert/mailer user
9. Treasure Chest, Glendora, CA
    * Insert printer
10. Albertson's Stores, Boise, ID
    * Insert/mailer user

4.2.7.2 U.S. North Central SC-Paper Markets

The North Central region is the largest printing and writing paper consumer in the U.S., because of concentration of large nationwide commercial printers in the Chicago area. The total estimated SC-paper demand was about 200,000 tons/year, of which more than 50 percent was supplied by the domestic producer, Champion. The Canadian shipments to this region were about 30,000 tons/year and mostly supplied from Abitibi-Price, Consolidated-Bathurst and St. Mary's Paper. German and Finnish companies dominated the off-shore imports of SC-paper (Figure F.4.20).

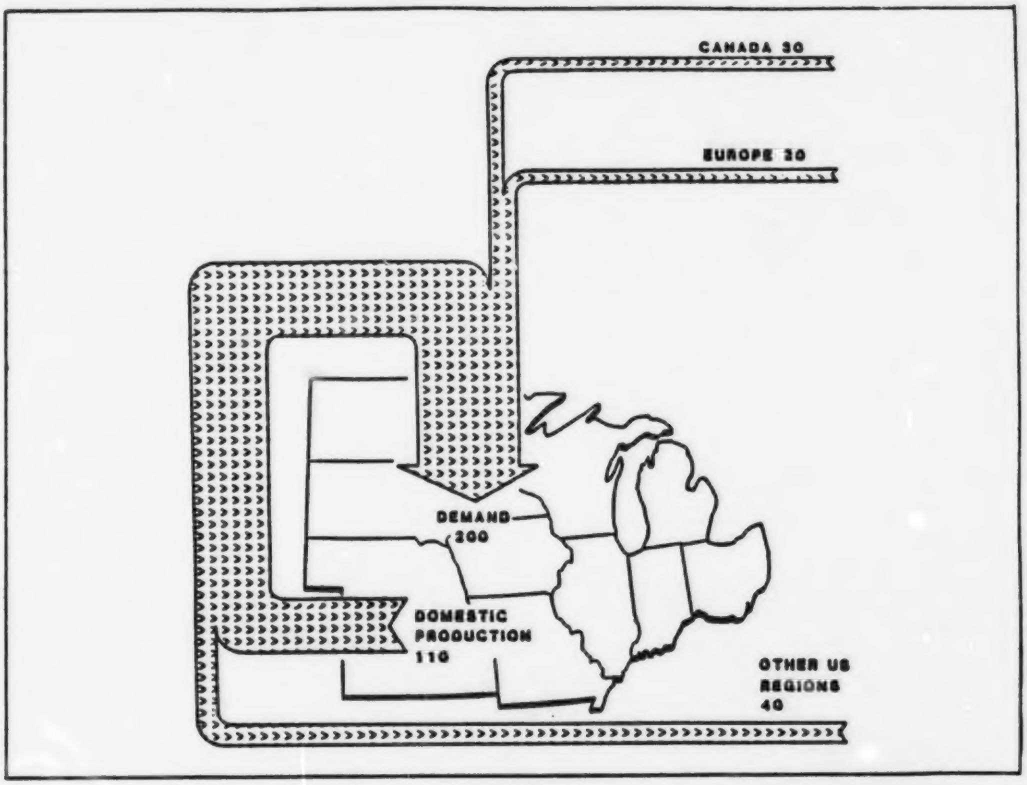

CANADA 30
EUROPE 30
DEMAND 200
DOMESTIC PRODUCTION 110
OTHER US REGIONS 40

Figure F.4.21. ESTIMATED U.S. NORTH CENTRAL SC-PAPER DEMAND/SUPPLY STRUCTURE IN 1985.

The domestic SC-paper production reached the level of 120,000 tons in 1985 (Champion, Sartell), but will increase to 330,000 tons after the start-up of the new Lake Superior, Duluth, MN SC-paper machine. Additionally the capacity will be increased by about 40,000 tons by year 2000 due to miscellaneous net improvements e.g. machine upgrades, etc. (Table T.4.5).

Table T.4.5. U.S. North Central Domestic SC-Paper Capacity

Capacity in 1986:	1000 tons/year
Champion, Sartell, MN	120
Announced capacity changes:	
Lake Superior Paper Co., Duluth, MN (1988)	210
Net Improvements	40
Total	250
Estimated capacity year 2000:	370

The North Central region has lately become less dominant in the printing and writing industry and also economically the importance of this region has been declining. The share of the catalog, insert/mailer printing as well as other commercial printing in the U.S. North Central as a part of the U.S. total is clearly declining as indicated in Figure F.4.22. In the magazine and book printing/publishing the share seems to remain at current level.

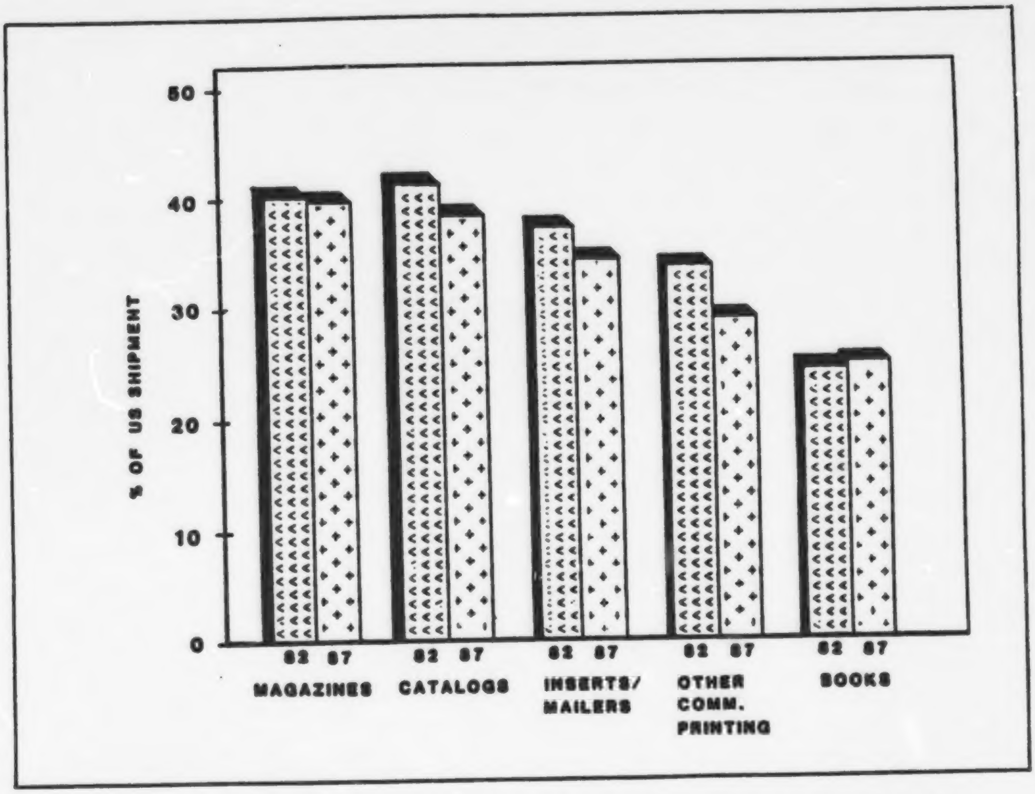


Figure F.4.22. END-USE INDUSTRIES SHARE OF THE TOTAL U.S. SHIPMENTS IN THE U.S. NORTH CENTRAL REGION.

Based on the growth in the major SC-paper end use industry, decline in the importance of the North Central region as a major printing/publishing area and the increased penetration of SC-paper in the U.S. printing industry, we have estimated that the demand of SC-paper will reach annual 500,000 tons per year 2000.

After the start-up of the new Lake Superior paper machine, this region will be a net exporter of SC-paper in the late 80's and early 90's. However, the demand will exceed the domestic production in the 90's and the estimated imports demand in year 2000 will account for about 200,000 tons/year (Figure F.4.23).

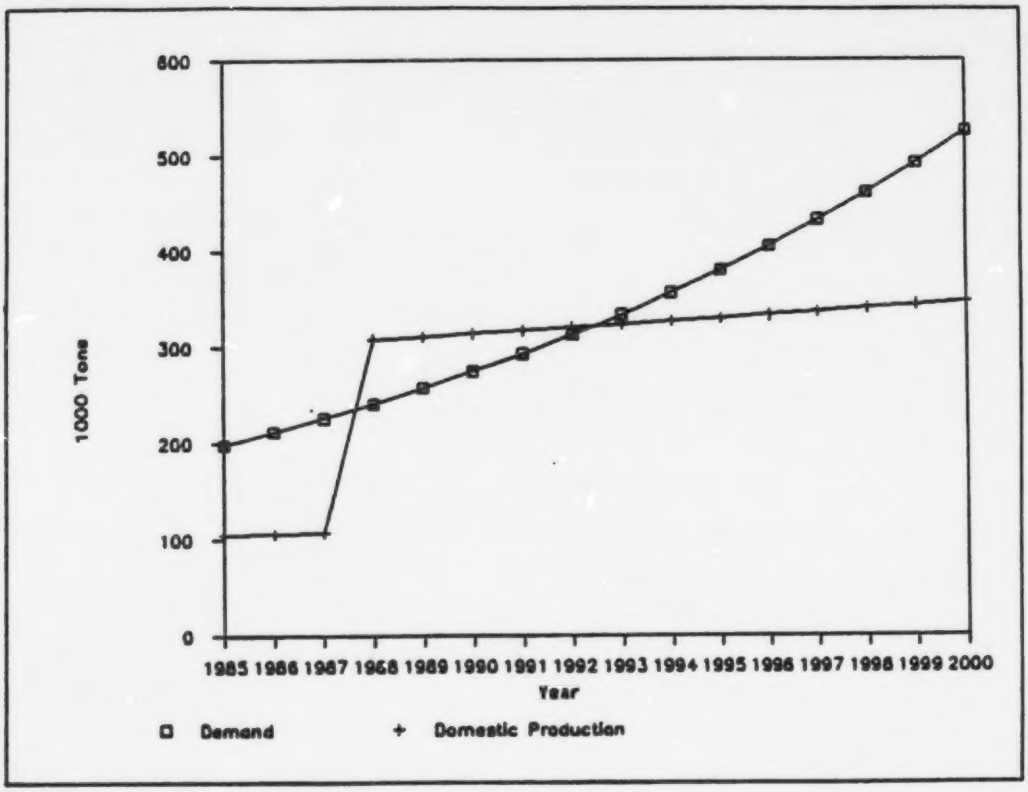


Figure F.4.23. ESTIMATED U.S. NORTH CENTRAL SC-PAPER DEMAND AND PRODUCTION.

Major importers of SC-paper to the North Central region in 1985 are listed in Table T.4.6.

Table T.4.6. Main Competitors in the U.S. North Central SC-Paper Markets (1985)

	1000 tons/year	Grade
1. U.S. North East	40	SC-B
* Champion, NY		
* Madison Paper, ME		
2. Ontario and Quebec	30	SC-B
* St. Marys Paper, ON		
* Abitibi-Price, PQ		
* Consolidated-Bathurst, PQ		
3. Europe	20	SC-A
* Finnpap, Finland		SC-B
* Haindl, Feldmühle, Germany F.R.		

Major printers and publishers in the U.S. North Central region are shown in Table T.4.7.

Table T.4.7. Major U.S. North Central Printers/Publishers

1. Meredith, Des Moines, IA
   - Magazine publisher
   - Magazine, insert/mailer and catalog printer
2. Penton/IPC, Cleveland, OH
   - Magazine publisher
3. Hartcourt Brace, Cleveland, OH
   - Magazine publisher
4. R.R. Donnelly, Chicago, IL
   - Magazine, catalog, insert/mailer printer
5. World Color Press, Effingham, IL
   - Magazine, insert/mailer printer
6. Brown Printing, Waseca, MN
   - Magazine, catalog printer
7. Quad Graphics, Chicago, IL
   - Magazine printer
8. W.F. Hall, Chicago, IL
   - Magazine, catalog printer
9. Target Stores, Minneapolis, MN
   - Insert/mailer user
10. GFV Communications, Livonia, MN
    - Insert/mailer printer
11. Sears, Chicago, IL
    - Insert/mailer user and catalog printer
12. Federated Dept. Stores, Cincinnati, OH
    - Insert/mailer user
13. Dayton Hudson, Minneapolis, MN
    - Insert/mailer user
14. Montgomergy Ward, Chicago, IL
    - Insert/mailer user
15. May Dept. Stores, St. Louis, MO
    - Insert/mailer user
16. The Kroger Co., Cincinnati, OH
    - Insert/mailer user
17. John Blair, Elk Grove, IL
    - Catalog printer
18. Webb Co., Minneapolis, MN
    - Catalog printer
19. Speigal, Chicago, IL
    - Catalog printer
20. Fingerhut, Minnetonka, MN
    - Catalog publisher
21. Lane Bryant, Indianapolis, IN
    - Catalog publisher

4.2.7.3 U.S. West South Central SC-Paper Markets

The printing and publishing industry in the U.S. West South Central region is currently undeveloped. The region's share of the total U.S. GNP was in 1985 estimated to 10 percent, but the share of the printing/publishing industry only 6 percent of the total U.S. shipments.

SC-paper demand is estimated to be 30,000 tons, of which 25,000 tons were imported from Europe (Figure F.4.24).

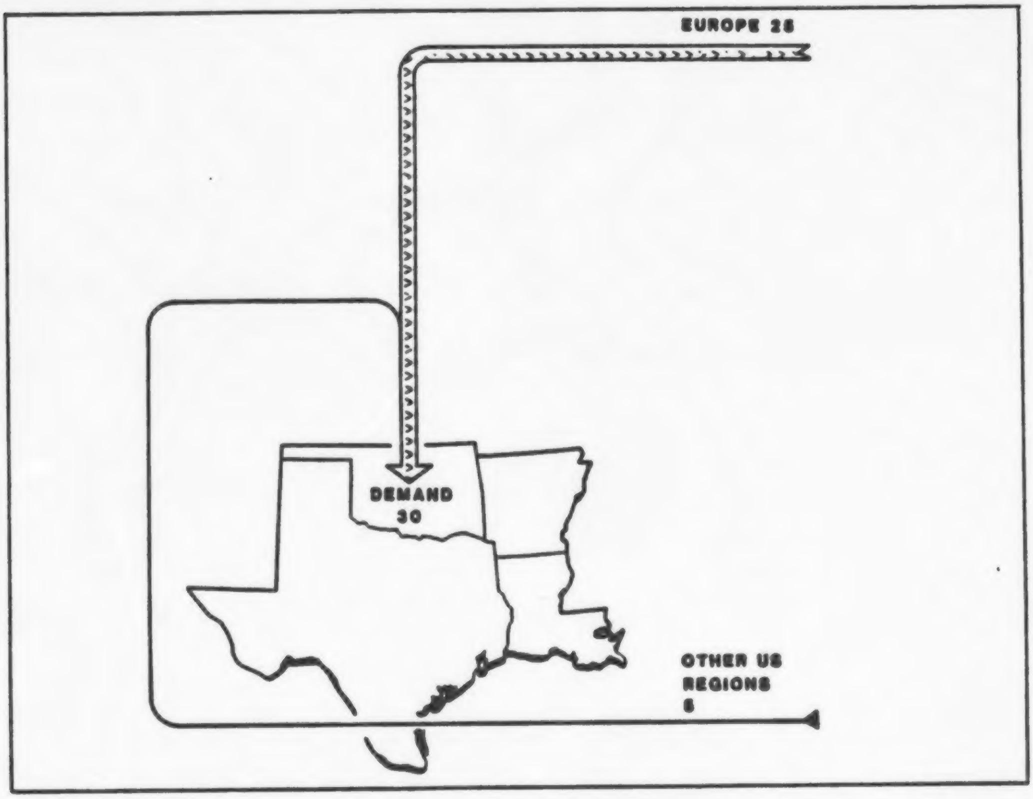


Figure F.4.24. ESTIMATED U.S. WEST SOUTH CENTRAL SC-PAPER DEMAND/SUPPLY STRUCTURE IN 1985.

The end use industry in this region is growing faster than in the U.S. on average as illustrated in Figure F.4.25. However, due to the low total printing paper demand and rather high current penetration of SC-Paper, the SC-paper demand is growing remarkably slower than in the U.S. West region. The estimated demand in year 2000 is only about 100,000 tons. There are no plans to start production of SC-paper in this area before the year 2000.

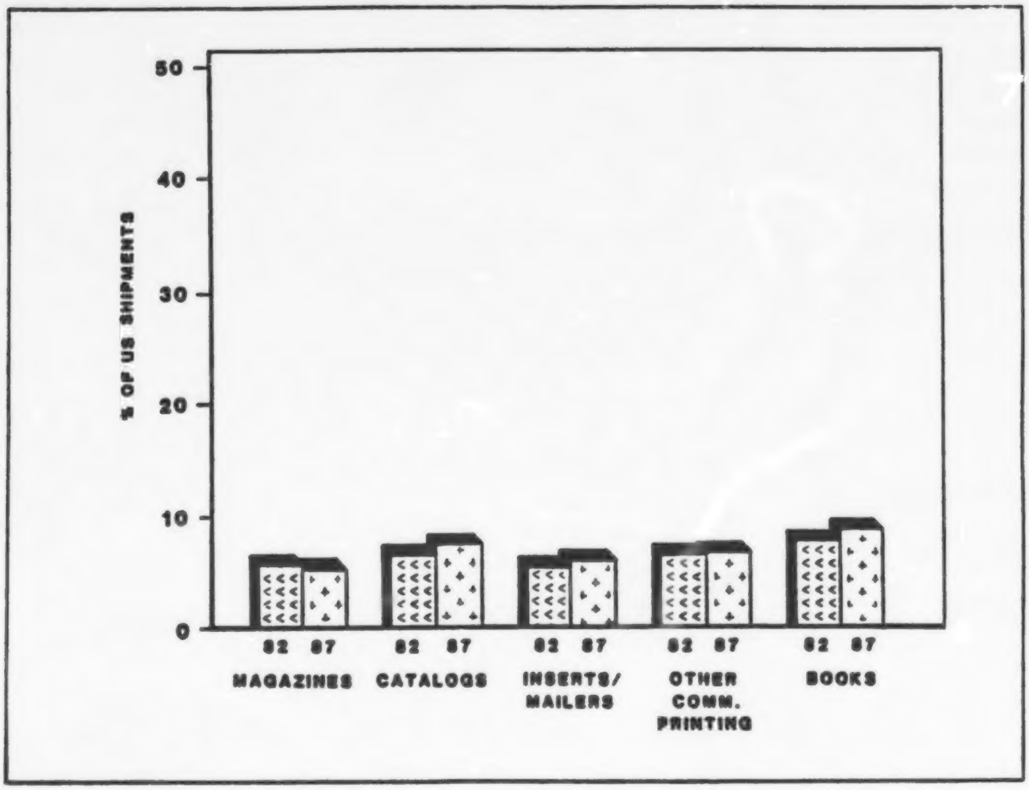


Figure F.4.25. U.S. WEST SOUTH CENTRAL END USE INDUSTRIES SHARE OF THE TOTAL U.S. SHIPMENTS.

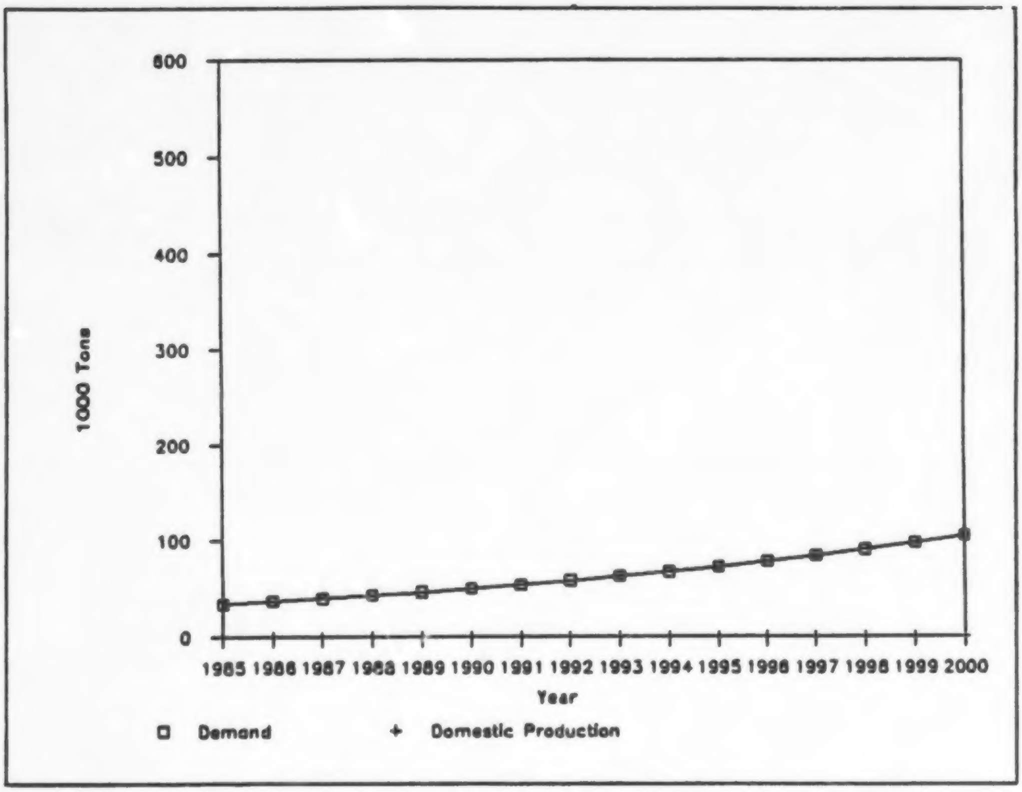


Figure F.4.26. ESTIMATED U.S. WEST SOUTH CENTRAL SC-PAPER DEMAND

Currently the largest off-shore exporters of SC-paper to this region are Finnpap from Finland and Feldmühle from Germany. Lake Superior, Duluth, MN mill will be a strong competitor also in the U.S. West South Central region after the start-up of the new paper machine.

The major users of printing paper in this region are listed in Table T.4.8.

Table T.4.8. Major U.S. West South Central Printers/Publishers

---

1. The Southland Corp., Dallas, TX
   * Insert/mailer user
2. Wal-Mart Stores, Bentonville, AR
   * Insert/mailer user
3. T.G. and Y. Stores Co., Oklahoma City, OK
   * Insert/mailer user

4.2.7.4 Summary of the Western U.S. SC-Paper Markets

A strong competition will appear on the Western U.S. SC-paper markets during the next 5 years. This is caused by the new capacity coming on stream in the U.S. and Eastern Canada, when simultaneously import demand will both in tonnage and percentage wise be healthiest in U.S. West, where the demand is estimated to grow by more than 200,000 tons by the year 2000. As shown in Table T.4.9 by the end of the century import demand of SC-paper will grow in the Western U.S. markets to 0.55 million tons in spite of the new capacity additions.

Table T.4.9. Estimated Western U.S. SC-Paper Import Demand[x)]

	1985	1992	2000
	(1000 tons/year)		
U.S. West	50	130	270
U.S. North Central	90	10	180
U.S. West South Central	30	60	100
TOTAL	170	200	550

x) Includes shipments from other U.S. regions.

4.2.8 Pacific Rim SC-Paper Markets

4.2.8.1 Japanese SC-Paper Markets

The supply to the Japanese SC-paper markets is dominated by Finnpap from Finland, which accounted for more than 55 percent of the total 160,000 ton demand in 1985 (Figure F.4.27). Another important supplier was West Germany - Feldmühle and Haindl - with 10,000 tons. Currently the only domestic SC-paper producer is Oji Paper in Tokomai with the capacity of 65,000 tons/year.

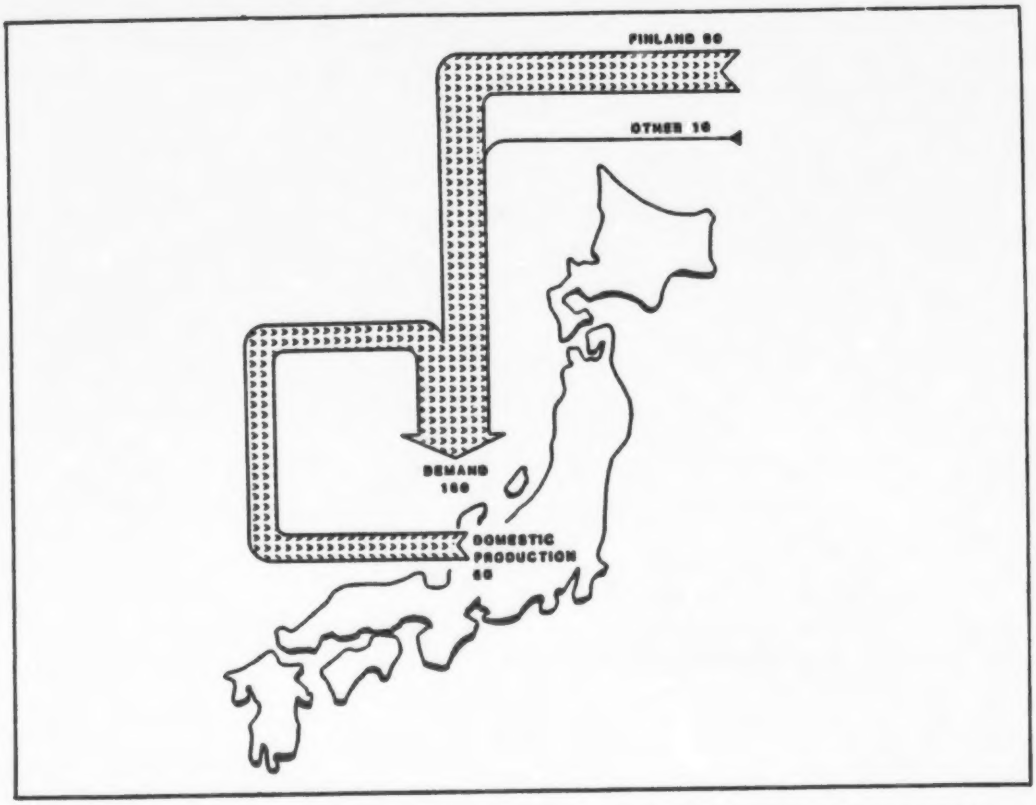


Figure F.4.27. SC-PAPER DEMAND/SUPPLY STRUCTURE IN JAPAN IN 1985

Although there are no announced or planned SC-paper capacity additions in Japan, the market demand development could provide for a new 110,000 annual ton machine to come on stream in year 1995. Other miscellaneous domestic net improvements will account for an additional 10,000 tons capacity during the next 13 years.

The catalog and directory business is expected to be the fastest growing SC-paper consuming sector in Japan with an estimated 8 percent/year growth to 1995 and 6-7 percent from 1995 to year 2000. Also the healthy growth in the magazine publishing and printing industry, about 4 percent/year, will effect and support a 6 percent/year growth in SC-paper demand.

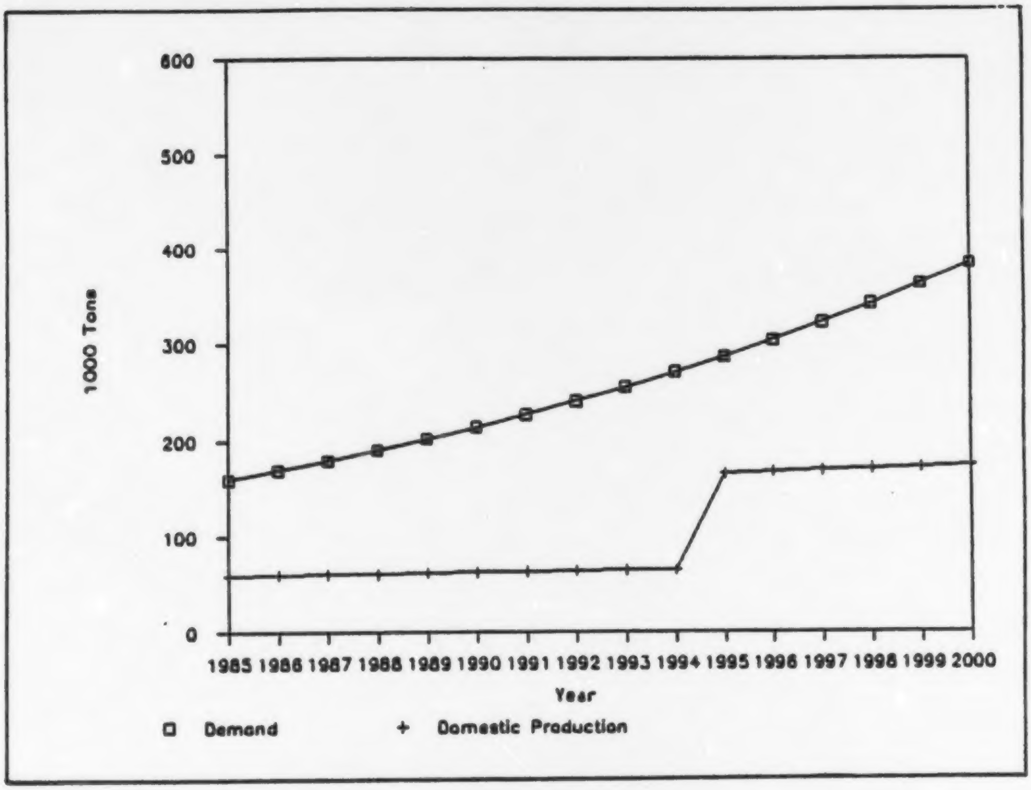


Figure F.4.28. SC-PAPER DEMAND AND PRODUCTION IN JAPAN

Major SC-paper consumers are listed in Table T.4.10.

Table T.4.10 Major Japanese SC-Paper Consumers

Printers:	Toppan Printing
	Dainippon
	Tosho Printing
	Kyodo Printing

The net import of SC-grade paper to Japan is estimated to 150,000 tons in 1992 and 120,000 tons after the start-up of the assumed new SC-paper machine.

4.2.8.2 SC-Paper Markets in the Republic of Korea

The most obvious characteristic of the Korean paper and board industry is its rate of expansion - production passed the one-million level in 1974 and reached 2.3 million tons in 1985. Growth in output has slowed down over the past few years but is still faster than in most other papermaking nations.

The raw material situation has been a long term problem in Korea. Pulp imports, 680,000 tons in 1985, have been the major source of supply for many years, thus subjecting the mills to fluctuations in the international pulp business. Partly as a consequence of the dependence of import pulp, the paper industry has turned to using waste paper. Currently imports account for 50 percent of the waste paper consumption, due to the lack of organized waste paper collection.

Paper and board imports, some of which have been restricted by the state, have been gradually increasing over the years, but are still remarkably low. In 1985, the total paper and board imports were 89,000 tons, most of which were kraft liner and special papers (high chemical pulp content). Groundwood printing and writing papers are supplied by domestic producers and for years the imports of uncoated or coated groundwood papers and newsprint have been negligible. Additionally the new Chonju Paper Mfg. Co. Ltd.'s newsprint machine has caused overcapacity in newsprint markets and prompted newsprint mills to allocate greater machine time to the uncoated groundwood paper production.

The SC-type paper demand in Korea is currently estimated to be 120 tons per year for magazines. Hong Won, Chonju and Moorim paper mills are now manufacturing this grade (Table T.4.11).

Table T.4.11. Domestic SC-Paper Capacity in the Republic of Korea

	1000 tons/year
1. Hong Won Paper Mfg. Co., Ltd., Pyungtaek-Cun	46
2. Chonju Paper Mfg. Co., Ltd., Chonju	40
3. Morrim Paper Mfg. Co., Ltd. Daegu	42
TOTAL	148(1)

(1) Most of the production is freesheet printing and writing paper.

The demand of SC-type printing and writing paper in Korea is estimated to grow to 30,000 tons by the year 2000. However, it is most likely that this will be supplied by domestic producers, and the imports demand will remain at the current very low level.

4.2.8.3 SC-Paper Markets in the People's Republic of China

The printing and writing paper consumption in the People's Republic of China reached 1,910 million tons in 1985. Only 70,000 tons of this was imported, mainly from Scandinavia, the rest being produced domestically in many small mills in many cases using also non-wood fibers.

SC-paper demand was only about 1,000 tons in 1985 and it was used mainly for export oriented magazines. The increased demand of magazines will cause the SC-paper consumption to increase to about 40,000 tons by the end of this century. It is assumed that all of this paper will be imported. The major competitors in these SC-paper markets will be the Republic of Korea and the Scandinavian countries (Finland and Norway).

4.2.8.4 Summary of Pacific Rim SC-Paper Markets

Total usage of printing and writing paper in Japan, Republic of Korea and People's Republic of China was about 7 million tons in 1985. The paper markets in these countries are largely self-sufficient, and the countries are net exporters of printing and writing papers - import 160,000 tons and exports 420,000 tons in 1985.

SC-paper is currently consumed mainly in Japan but is a growing grade in the other two countries. The estimated SC-paper imports demand in the selected three countries as well as in the other Pacific Rim countries is summarized in Table T.4.12.

Table T.4.12. SC-Paper Import Demand in the Pacific Rim Countries

	1985	1992	2000
	1000 tons/year		
Japan	100	150	120
Republic of Korea	-	-	-
People's Republic of China	1	20	40
TOTAL	101	170	160
Australia	50		
New Zealand	2		
Singapore	2		
Hong Kong	2	Not Calc.	Not Calc.
Malaysia	5		
Indonesia	5		
Taiwan	-		
Thailand	-		
Philippines	-		
TOTAL	66		

4.2.9 Summary of SC-Paper Markets

Currently the SC-paper markets in the selected market areas are 450,000 tons/year. We have estimated that these markets will grow to 1.4 million tons/year by year 2000. The import demand to the market areas will grow from the current 270,000 tons/year level to 800,000 tons/year. The growth predictions on the markets, both for total growth and imports, are based on the anticipated structure changes of end users for the grade in the regions, a continuing trend of the growth in the previous years and the local production capacity developments including the opportunity by the market for new machines.

Of the market included in the study, the U.S. and Japanese markets provide opportunities for additional capacity, both markets showing a healthy growth trend and an adequate volume for profitable penetration. Both the Chinese and Korean markets can for the time being be neglected due to their small size.

The total demand for the Western U.S. and Japanese markets was in 1985 440,000 tons and 270,000 tons of that was imported. The outlook for year 1992 and 2000 shows an increase in demand to 705,000 tons and 1.33 million respectively. At the same the import demand will grow 330,000 tons in 1992 and 820,000 tons in year 2000, already considering an additional new machine in Japan, capacity 110,000 tons/year, and another one on the Western U.S. market, capacity 200,000 tons/year.

As shown in Table T.4.13, the European SC-paper producers, among them Finnpap and Feldmühle, distribute their paper worldwide while the North American shipments are directed entirely to the domestic markets.

Major North American producers are Champion, Madison Paper and Great Lakes of the U.S. companies and St. Marys, Consolidated-Bathurst, Abitibi-Price and CIP of the Canadian companies.

Table T.4.13 Main Competitors in the SC-paper Markets in 1985

Market Area	Quebec & Ontario	U.S. North East (1000 tons/year)	Finland & Germany
1. Domestic	2	-	2
2. U.S. West	2	20	30
3. U.S. North Central	30	40	20
4. U.S. West South Central	-	5	25
5. Japan	-	-	90
6. South Korea	-	-	-
7. China	-	-	1
TOTAL	34	65	168

Table T.4.13.A. SC Market Outlook in Selected Market Areas

	Demand			Prod. (1000 tons/year)			Import			Export		
Market Area	'85	'92	'00	'85	'92	'00	'85	'92	'00	'85	'92	'00
Domestic	4	15	30	0	0	0	4	15	30	0	0	0
U.S. West	50	110	300	0	0	0	50	110	300	0	0	0
U.S. North Central	200	310	530	110	330	340	90	0	190	0	20	0
U.S. West South Centr.	30	55	100	0	0	0	30	55	100	0	0	0
Japan	160	230	400	60	65	170	100	165	230	0	0	0
Republic of Korea	1	10	30	1	10	30	0	0	0	0	0	0
People's Rep. of China	1	20	40	0	0	0	1	20	40	0	0	0
TOTAL	446	750	1430	171	405	540	275	365	890	0	20	0

4.3 Coated Groundwood Papers

4.3.1 Classification of Coated Papers

In North America coated papers are generally divided into two main groups depending on whether the paper is coated on one side (C1S) or on two sides (C2S). C1S-paper is generally coated freesheet and used mainly for labels.

C2S papers range in quality downward from a super-premium grade, representing the most expensive and high quality sheet, to No. 5 coated at the other end of the scale. Super-premium and No. 1 , 2 and 3 coated are essentially based on chemical pulps, while No. 4 could contain a large amount of mechanical pulp, and No. 5 contains actually only mechanical pulp. Currently about 55 percent of No. 4 coated is groundwood based, the rest being coated freesheet. 97 percent of No. 5 coated is groundwood based. No. 5 is the most important grade in terms of tonnage, and successively each higher quality grade contains a smaller supply than the corresponding lower quality one.

The North American classification system for coated papers is presented here under in Table T.4.14.

Table T.4.14. Classification of Coated Papers in North America

Grade No.	% Coated Groundwood Papers	Typical End Uses	Brightness
Super-premium	0	Annual Reports	88+
No. 1	0	Annual Reports	85-88
No. 2	0	Expensive Advertising	78-82
No. 3	0	Advertising	79-83
No. 4	55	Magazines	72-78
No. 5	97	Directories Cataloges, Magazines	68-72

In Western Europe coated groundwood papers are divided as follows:

1. Heavy weight coated (HWC)
2. Medium weight coated (MWC)
   73 g/m^2 and +
3. Light weight coated (LWC)
   46-72 g/m^2
4. Ultra light weight coated (ULWC)
   45 g/m^2 and less

The Western European LWC is very close to the No. 5 coated, although a small tonnage of No. 5 papers have higher basis weight than 73 g/m^2. MWC/HWC grades are related to the North American No. 4 coated.

The Japanese classification system differs both from the North American and Western European ones as shown in Table T.4.15.

Table T.4.15 Classification of Coated papers in Japan

Grade	Chemical Pulp Percent	End Uses
Art paper (A1)	90-100	Annual reports, catalogs other high-quality printing
Standard coated		
- Freesheet (A2)	90-100	Advertising materials, illustrated books
- Groundwood (B2)	40-90	Catalogs, other commercial printing
Lightweight coated		Books, brochures, magazines
- Freesheet (A3)	90-100	catalogs,
- Groundwood (B3)	40-90	Commerical printing
Other coated grades	70-100	Various purposes

The groundwood based, standard coated B2-grade corresponds to the North American No. 4 coated and groundwood based, lightweight coated (MWC) B3-grade to No. 5 coated (LWC).

4.3.2 U.S. Coated Groundwood Paper End Uses

The end use markets for coated groundwood papers are largely the same printing and writing houses that consume uncoated groundwood papers and coated freesheet grades (Figure F.4.4). At the lower end the most essential competitor is supercalendared (SC) paper, which is an alternative grade to coated groundwood in magazines, catalogs, inserts/mailers, etc. The biggest benefit of SC-paper is its cost-competitiveness, while the high quality is the main advantage of No. 5 coated. For the higher quality grades of coated groundwood, mainly in the high quality advertising, the main competitor is No. 3 coated paper. In the future also the pigmented grades will be competing in the same end users.

The main end use segments of coated groundwood papers are:

- magazines
- books
- other converting
- catalogs
- inserts/mailers
- other commercial printing

These end use sectors are discussed in detail in Section 3.2.2. and the following is only a summary of coated groundwood paper usage in the main end use sectors.

MAGAZINES

The most important market for No. 5 coated paper (LWC) is magazines, which represents about 56 percent of the total demand of this grade. It means that the trends in the magazine industry dictates the trends in the No. 5 coated demand. The strongest competition for No. 5 coated in the future will come from SC-paper. Several magazine publishers have already opted for additional consumption of SC-paper, and the attractive price structure may convert other publishers in the same direction. In high quality special magazines the use of No. 4 and No. 3 coated paper is increasing and that forms threat to No. 5 grade. In our forecast the market share for No. 5 coated will drop from the current 70 percent level to 68 percent and the share of No. 4 will remain at the current 12.4 percent level. As to tonnage, the demand of No. 5 grade will grow from 1.75 million tons in 1985 to about 2.7 million tons by the year 2000, as illustrated in Figure F.4.29.

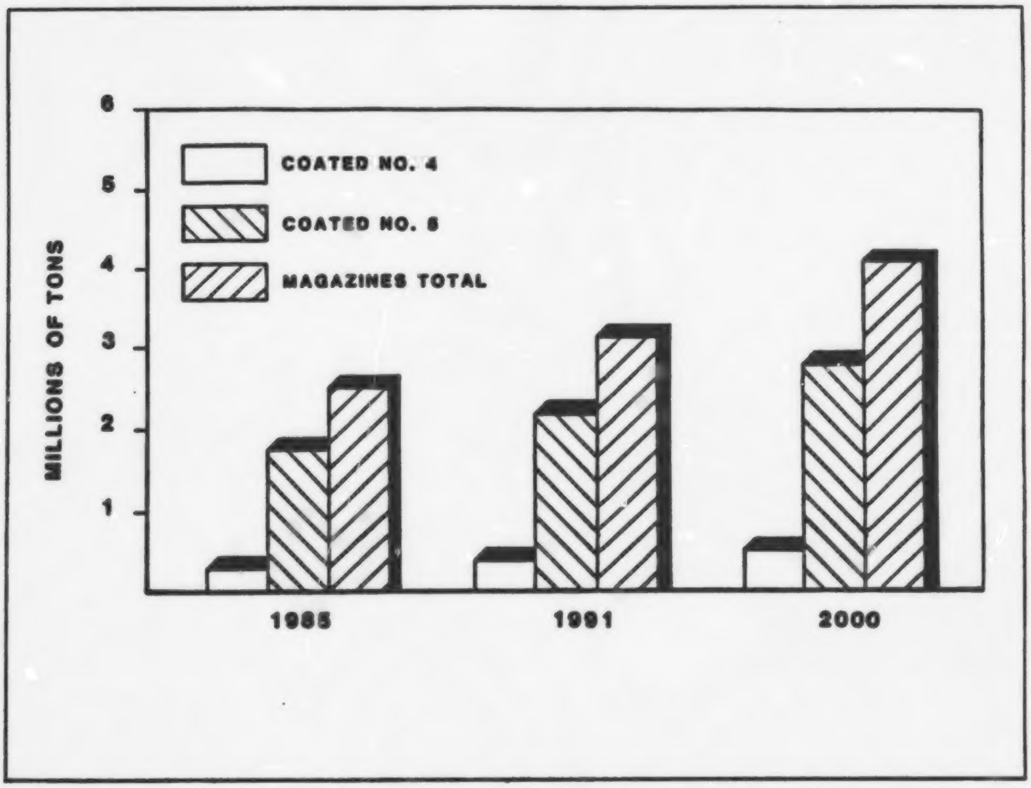


Figure F.4.29. COATED GROUNDWOOD USAGE IN MAGAZINES

BOOKS

The consumption of high quality coated groundwood paper in books will remain at a comparably low level. The annual demand of No. 5 grade for books is estimated to grow from 60,000 tons/year in 1985 to about 120,000 tons by year 2000 and No. 4 from 120,000 tons to 160,000 tons correspondingly.

OTHER CONVERTING

Also in other converting sectors, which include check printers, gummed paper converters, foil laminating, gift wrap converters, etc., the consumption of No. 5 coated is low, 70,000 tons in 1985 and by the year 2000 the demand is estimated to slightly exceed 100,000 tons/year. The consumption of No. 4 grade in these sectors is negligible.

CATALOGS

The catalog business is an important consumer of both No. 5 and No. 4 coated papers and the market shares of these grades in 1985 were 40 percent and 18 percent correspondingly. We have assumed that No. 5 coated paper will maintain its 40 percent market share and that No. 4 will slightly increase its market share from 18 percent to 19 percent mainly gaining shares from uncoated freesheet. The growth in terms of tonnage is shown in Figure F.4.30. No. 5 demand should grow from about 0.7 million tons to 1.2 million tons/year and No. 4 should double from the current 0.3 million tons/year by the year 2000.

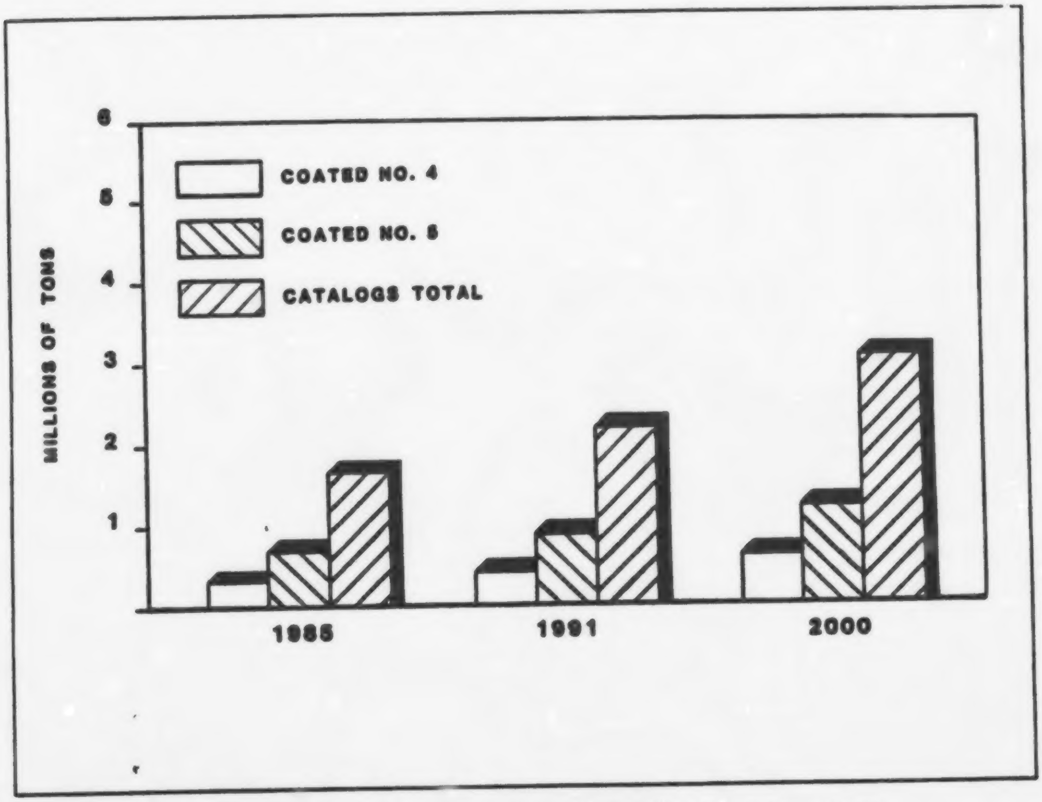


Figure F.4.30. COATED GROUNDWOOD USAGE IN CATALOGS

INSERTS/MAILERS

The insert/mailer industry is a medium growing segment, growth 4.4 percent/year. Additionally No. 5 coated paper will increase its share from the current 42 percent level to 58 percent by year 2000. In tonnage terms this corresponds to a growth from 470,000 tons to about

1.2 million tons (Figure F.4.31). The main reason for the estimated share increase of No. 5 coated is the superior printing quality of coated paper compared to uncoated groundwood (improved news). Especially in special advertising, a good appearance is very important.

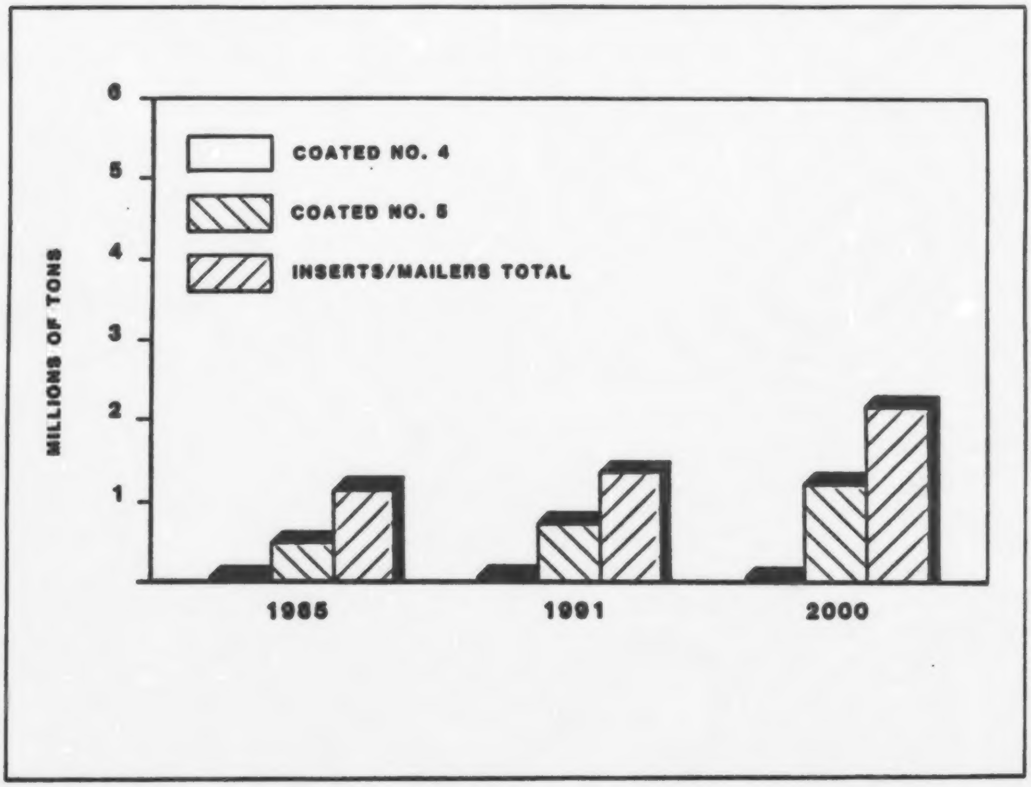


Figure F.4.31. COATED GROUNDWOOD PAPER USAGE IN INSERTS/MAILERS

OTHER COMMERCIAL PRINTING

This category includes all commercial printing grades other than catalog, directory and insert/mailer printing. The segment is the largest user of printing and writing paper in U.S. 3.7 million tons in 1985. From the coated groundwood paper point of view this segment is not very important: in 1985 the share of No. 5 coated was 4 percent and No. 4 5.6 percent of the total paper demand and in terms of tonnage 150,000 tons and 210,000 tons correspondingly. By the end of this century the demand of No. 5 is estimated to grow to 360,000 tons/year (6 percent market share) and No. 4 to 330,000 tons/year.

SUMMARY OF COATED GROUNDWOOD MARKETS IN THE U.S.

The summary of U.S. coated groundwood paper demand in 1985, 1992 and 2000 is illustrated in Figure F.4.32.

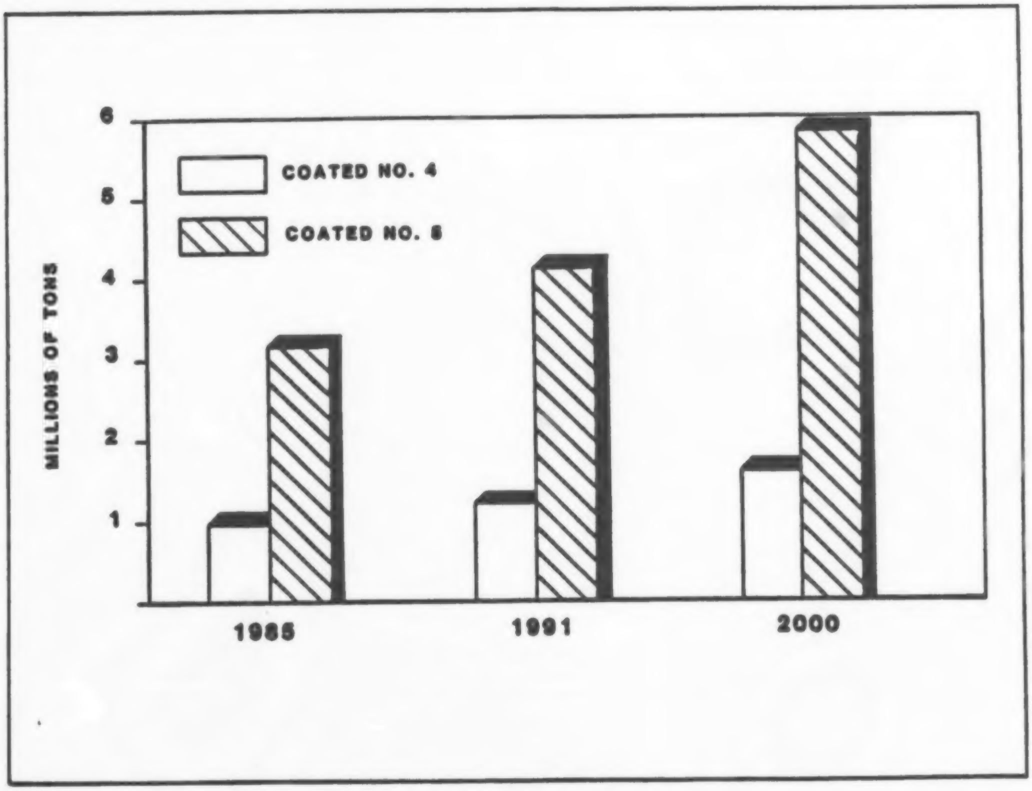


Figure F.4.32. U.S. COATED GROUNDWOOD PAPER DEMAND

Coated No. 5 paper should grow on average 4.8 percent/year from 3.2 million tons in 1985 to about 5.8 million tons in year 2000. The three main end use segments - magazines, catalogs and inserts/mailers - is estimated to maintain the 90 percent share of the total demand of the No. 5 grade.

About 55 percent of No. 4 paper output was coated groundwood in 1985 and the ratio should remain unchanged the next 13 years. The demand of No. 4 coated groundwood paper is estimated to grow from the current 520,000 tons to about 860,000 tons by 2000.

PACIFIC RIM MARKET END USES

In the Pacific Rim market area Japan dominates the coated groundwood markets as shown in Table T.4.15.

Table T.4.15a Coated Groundwood Demand in the Pacific Rim Markets

	1000 tons/year
Japan	600
Republic of Korea	80
People's Republic of China	20
TOTAL	700

About 40 percent of B3-grade coated paper (LWC) is consumed in magazine printing, another 40 percent in the advertising business (catalogs, inserts/mailers) and the remaining 20 percent for various other purposes. In the Republic of Korea and in the People's Republic of China almost all of the LWC type paper is used in magazines and export product catalogs.

4.3.3 Light Weight Coated (LWC) Papers

Light weight coated (LWC) paper is selected to represent coated groundwood grades in this study due to the following reason: (note that the term LWC is used also for No. 5 coated in the text following)

* The current markets of LWC-paper are big worldwide
* The growth in the LWC-markets is healthy and in volume very large (2.6 million tons by year 2000).
* LWC-paper is a semi-commodity product, and is not as specialized grade as MWC/HWC-grades.

Quality wise light weight coated paper is basically divided into two subcategories: offset-LWC (40 lb) and gravure-LWC (34 lb). The offset grade is currently the fastest growing sector due to its superior quality and the expansion of end use sector. Especially in Europe which has to be considered as a forerunner in LWC market enhancement, a lot of development has been done to further reduce the basis weight of LWC-paper. Presently for example Burgo in Italy is already producing an Ultra Light Weight Coated paper (40 g/m^2).

4.3.4 World LWC-Paper Demand/Supply

World consumption of coated groundwood paper was in 1985 slightly over 7.5 million tons. As shown in Figure F.4.33, about 90 percent of the total consumption resides in the two primary consuming regions - North America and Western Europe. Other major regions include Japan, about 4 percent, and Eastern Europe, about 3 percent.

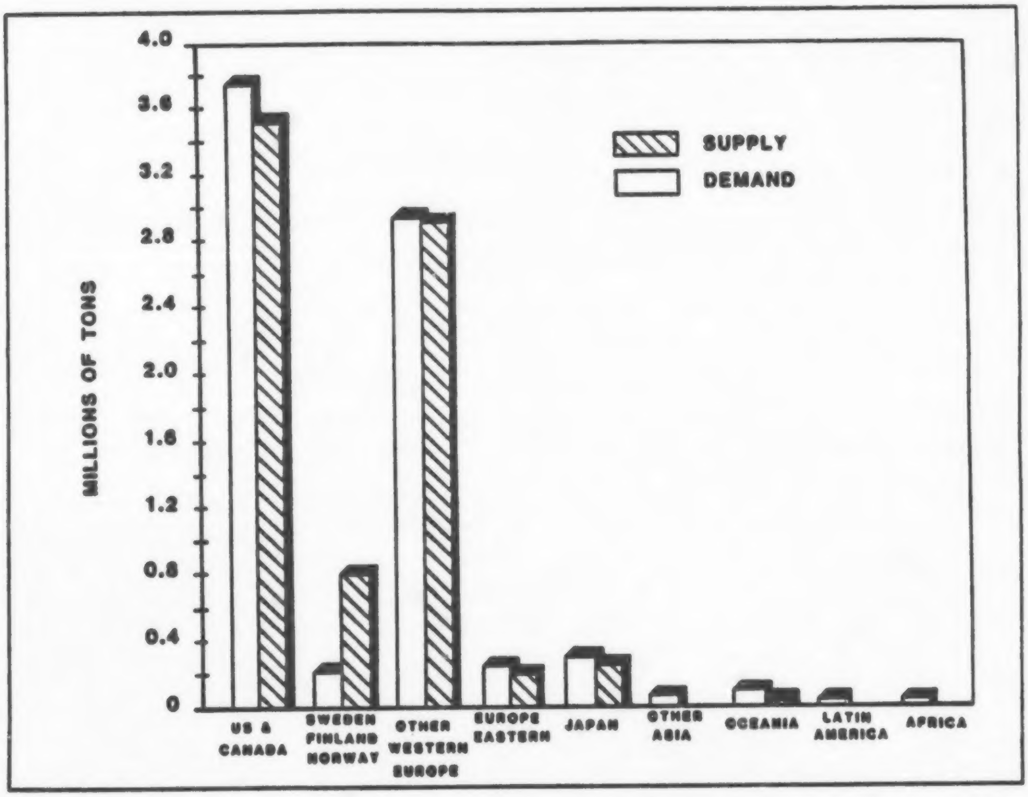


Figure F.4.33. REGIONAL COATED GROUNDWOOD PAPER DEMAND/SUPPLY IN 1985

Coated groundwood grades will continue their healthy growth, although the annual growth rate is estimated to drop from 9 percent a year in 1975-1985 to about 5 percent/year in 1985-2000. Regionally the growth rates in North America and Western Europe will be the lowest, 4.5 percent/year and 4.2 percent/year correspondingly, 6.3 percent/year in Japan and slightly over 10 percent/year in the other regions. As shown in Figure F.4.34 the consumption will reach the 10 million ton mark by the year 1991 and will be about 15.5 million tons by 2000.

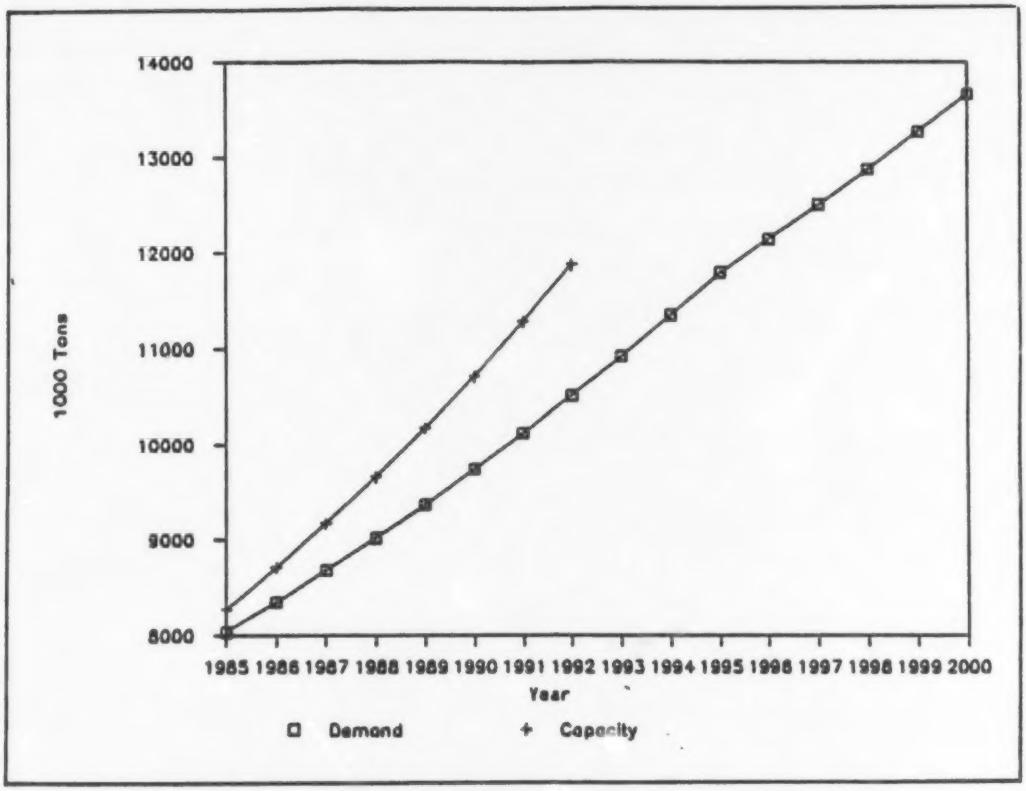


Figure F.4.34. WORLD COATED GROUNDWOOD DEMAND/CAPACITY

The current coated groundwood paper capacity is about 9 million tons per year (Appendix A.4.3) The announced and planned coated groundwood projects account currently for 3.2 million tons, which indicates that the capacity in 1991/92 should be about 12.2 million tons (Appendix A.4.4.) The demand/supply balance indicates that the coated groundwood paper products, especially LWC, are expected to run at 85 percent or lower capacity utilization through the later 80's and early 90's.

4.3.5 World Coated Groundwood Paper Trade

The major coated groundwood paper trade flows in the world in 1984 are illustrated in Figure F.4.35. Similarly as for the SC-paper market, Western Europe represents the key source for the trading tonnage of this grade, with outflows to most world locations.

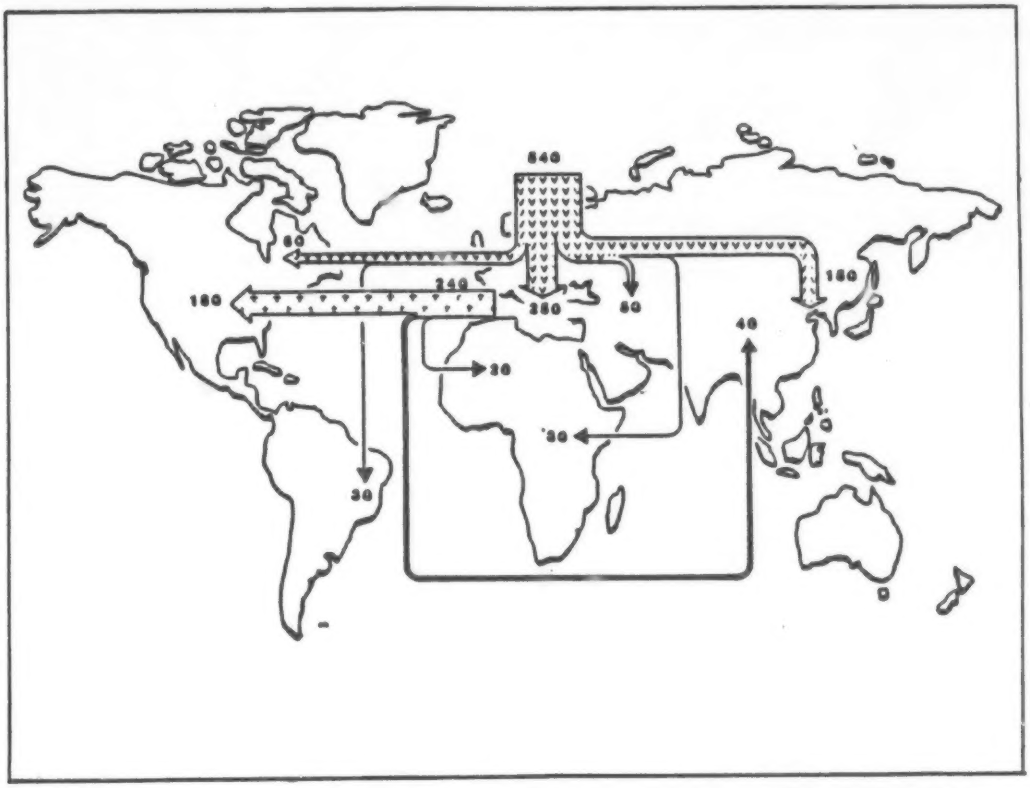


Figure F.4.35. SCANDINAVIAN AND WESTERN EUROPEAN COATED GROUNDWOOD SHIPMENTS IN 1984.

North America is the prime buyer of European coated groundwood paper (240,000 tons), with supplies of 190,000 tons to Asia and Oceania. Within North America close to 50,000 tons of this grade are traded between the U.S. and Canada.

The price of No.5 34 lb rotogravure coated groundwood was in 1985 930 USD/short ton and No. 5 40 lb offset 840 USD/short ton (Figure F.4.17). In 1986, the prices were declining and the 3rd quarter list prices were already about 80 USD/short ton lower. In February 1987 Champion International Corp. and Consolidated Papers Inc. reportedly further lowered No. 5, 40 lb to 680 USD/short ton.

The prices are estimated to further fluctuate decline due to overcapacity in the LWC-paper supply.

4.3.6 Domestic LWC-Paper Markets

Miramichi Pulp and Paper Inc., South Nelson mill in New Brunswick that was started up in 1986, is the first paper mill in Canada dedicated to the produciton of LWC-paper. Previously LWC and other coated groundwood grades have been produced by Kruger Inc. at Trois Rivieres in Quebec and by Abitibi-Price Inc., at Thunder Bay in Ontario. The Kruger mill has a capability to produce also LWC while the Abitibi mill produces only other coated groundwood grades. This production structure has also resulted in the low reported consumption of LWC-paper, only 30,000 of LWC tons out of 180,000 tons of coated groundwood papers total in 1985. However, it is probable that the actual consumption of LWC-type paper is higher than 30,000 tons - we have estimated 130,000 tons in 1985. This estimate is based on the coated groundwood paper demand structure in the U.S.: about 75 percent No. 5 coated (LWC) and the remaining 25 percent No. 4 coated (MWC).

The end useres of LWC-paper, printers and publishers, are highly concentrated to Ontario and Quebec. About 75 percent of magazines publishing industry is located in these two provinces and only about 21 percent in Western Canada. Based on the location of the end use industry, we have estimated that the LWC-paper demand in Western Canada is about 27,000 tons per year. Most of this, 21,000 tons, is supplied by the domestic producers (Figure F.4.35a). The main foreign supplier is the U.S.

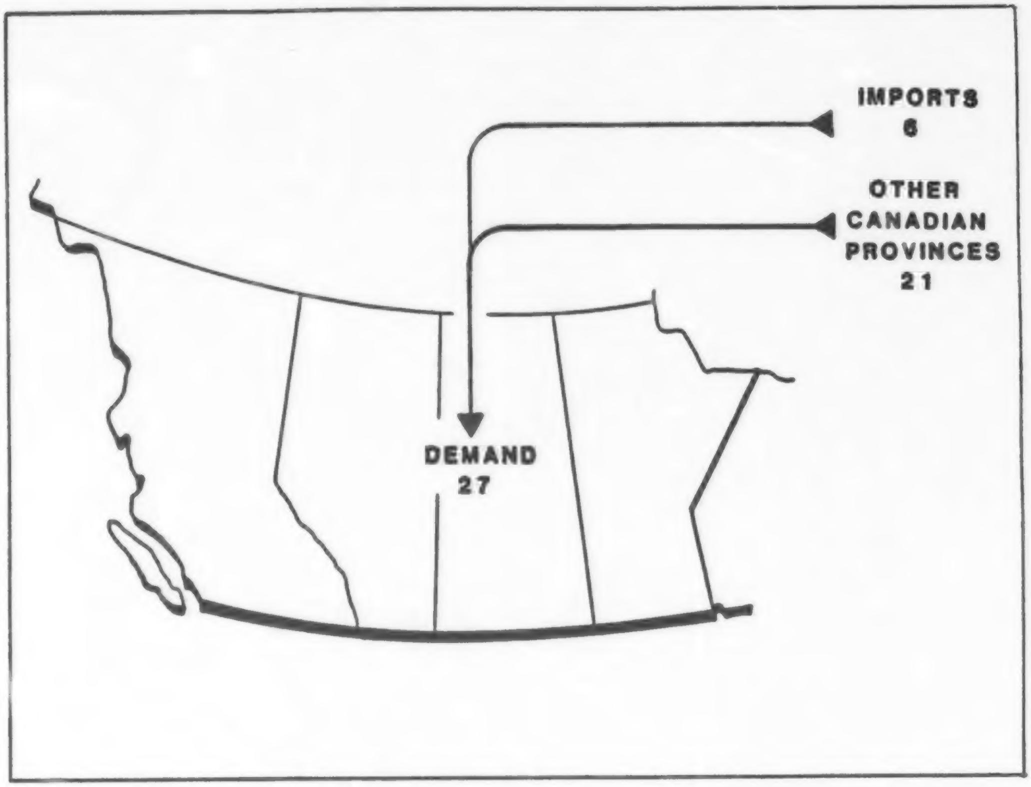


Figure F.4.35a. DOMESTIC MARKETS: ESTIMATED LWC-PAPER DEMAND/SUPPLY STRUCTURE IN 1985.

The growth in the LWC-paper demand in Canada, 5 percent per year is higher than in the U.S. One reason for this is the fact that some U.S. retailers and publishers buy more paper in Canada, print their inserts there, and then ship the completed jobs to the U.S. In Western Canada the LWC-paper demand is estimated to grow with the same 5 percent per year rate. In tonnage terms the demand will reach 60,000 tons by 2000.

Makin Pulp and Paper Ltd., has announced plans to built a 135,000 tons per year LWC-paper mill at Britannia Beach area in British Columbia. Originally this machine was planned to start up late 1988. However, the construction has not yet been started and it is probable that the project will be postponed or canceled. There are no other announcements or plans to build LWC-paper capacity in Western Canada.

4.3.7 Western U.S. LWC-Paper Markets

4.3.7.1 U.S. West LWC-Paper Markets

The analysis of the printing and writing paper end uses indicates that the LWC-paper demand in the U.S. West is 430,000 tons per year. James River at West Linn, OR is the only LWC paper manufacturer and produces about 100,000 tons of LWC on one machine. The rest of the demand is supplied mainly by the U.S. producers east of the Rocky Mountains. The off-shore imports of LWC-paper in 1985 was about 20,000 tons as shown in Figure F.4.36.

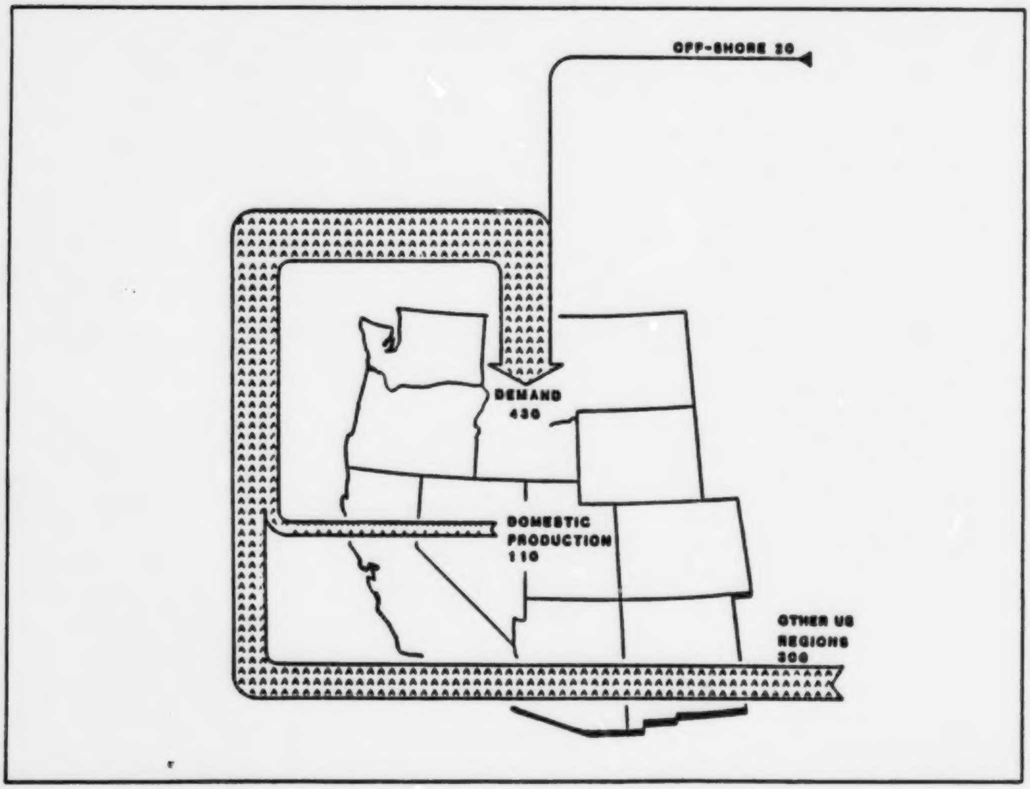


Figure F.4.36. ESTIMATED U.S. WEST LWC-PAPER DEMAND/SUPPLY STRUCTURE IN 1985.

Although currently there are no plans to increase the LWC-capacity in the U.S. West region, the market demand/supply situation could provide for a new 200,000 ton a machine going on stream in 1992 (Table T.4.16).

Additionally the regional capacity will increase 1 percent/year or total 20,000 tons by year 2000, due to the continuous trimmings and speed-ups of the existing machines.

Table T.4.16. U.S. West Domestic LWC-Paper Capacity

		1000 tons/year
Capacity in 1985:		
James River, West Linn, OR		110
No announced new capacity		
Assumed new paper machine	(1992)	200
Net improvements		20
Estimated capacity in year 2000		330

The printing and publishing business is estimated to grow in U.S. West faster than U.S. average. This combined with the substantial growth of the LWC-paper end use segments results in the predicted 5 percent/year growth in LWC-paper demand on up to year 2000 (Figure F.4.37).

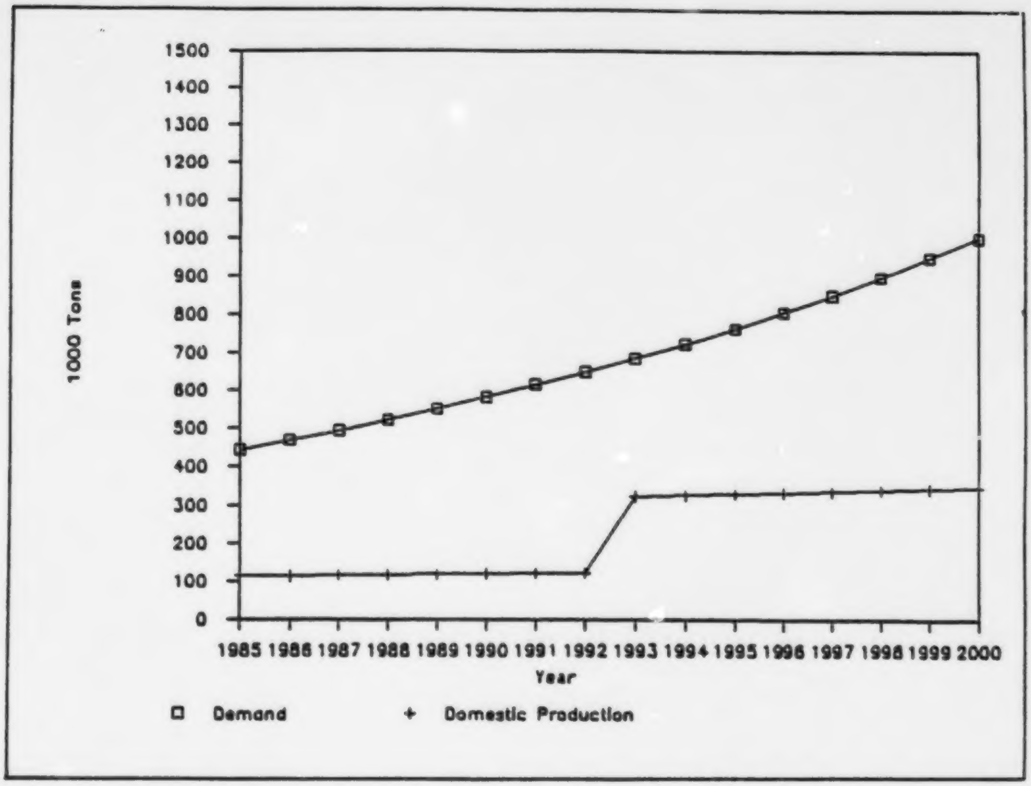


Figure F.4.37. U.S. WEST LWC-PAPER DEMAND AND DOMESTIC PRODUCTION

The import demand to U.S. West will be about 500,000 tons in 1992 and 700,000 tons year 2000.

The main "exporters" of LWC-paper to this region are the major U.S. LWC-paper producers: Consolidated, Champion, Weyerhaeuser, Mead, James River, etc. The most important off-shore sources are Finnpap from Finland and Feldmühle from Germany.

Because LWC-paper competes with SC-paper in the magazine, catalog and insert/mailer business, the main consumers of LWC-paper are basically identical to the potential users of SC-paper listed in Section 4.2.7.1.

4.3.7.2 U.S. North Central LWC-Paper Markets

The U.S. North Central region is currently nearly self-sufficient with regard to LWC-paper (Figure F.4.38). Off-shore imports totalled 10,000 tons in 1985 which is considered negligible or of minor importance compared to the total 1.21 million tons/year demand.

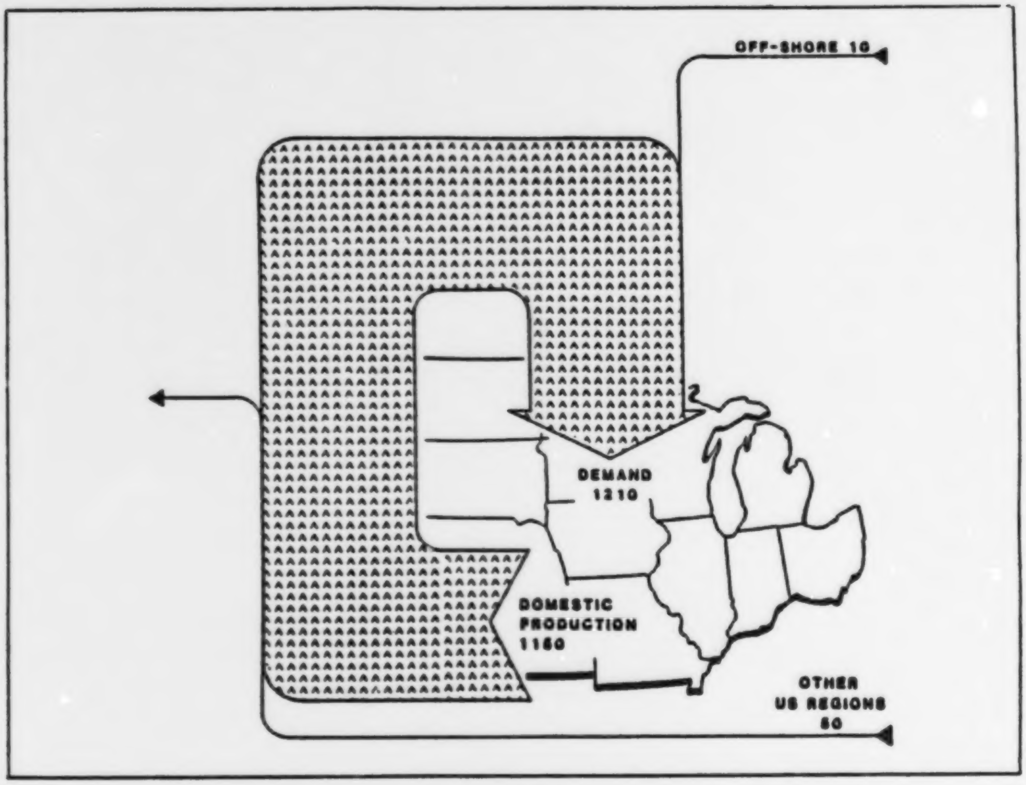


Figure F.4.38. ESTIMATED U.S. NORTH CENTRAL LWC-PAPER DEMAND/SUPPLY STRUCTURE IN 1985

The current LWC-capacity as well as the estimated new capacity additions are shown in Table T.4.18.

Table T.4.18. U.S. North Central Domestic LWC Production Capacity

Producer	Capacity 1000 tons/year
1. Blandin Paper Co., Grand Rapids, MN	170
2. Champion International, Sartell, MN	165
3. Consolidated Papers, Wisconsin Rapids, WI	190
4. Consolidated Papers, Whiting, WI	190
5. Mead Corp., Escanaba, MI	180
6. Midtech Paper Corp., Kimberly, WI	125
7. Pentair Industries Inc, Niagara, WI	190
TOTAL	1,210

	Announced/Planned New Capacity	
Consolidated Papers, Wisconsin Rapids, WI	1987	180
Mead Corp., Escabana, MI	1987	20
Blandin Paper Co., Grand Rapids, MN	1992	150
Net Improvements		200
TOTAL		550
ESTIMATED TOTAL CAPACITY IN 2000		1,760

The announced capacity additions include two new LWC-paper machines: Consolidated Paper, Wisconsin Rapids, WI mill with start-up in 1987 and Blandin Paper Co., Grand Rapids, MN mill with estimated start-up in 1992. Additional net improvements will increase the capacity by further 220,000 tons, which result in a total 1.76 million tons capacity in year 2000.

Due to the fact that the North Central region is loosing some market share in the U.S. printing and publishing industry the estimated growth in LWC-paper demand is moderate 3.6 percent/year on average to year 2000. As shown in Figure F.4.39 the net import demand will grow from the current 60,000 ton level: 380,000 tons in year 2000.

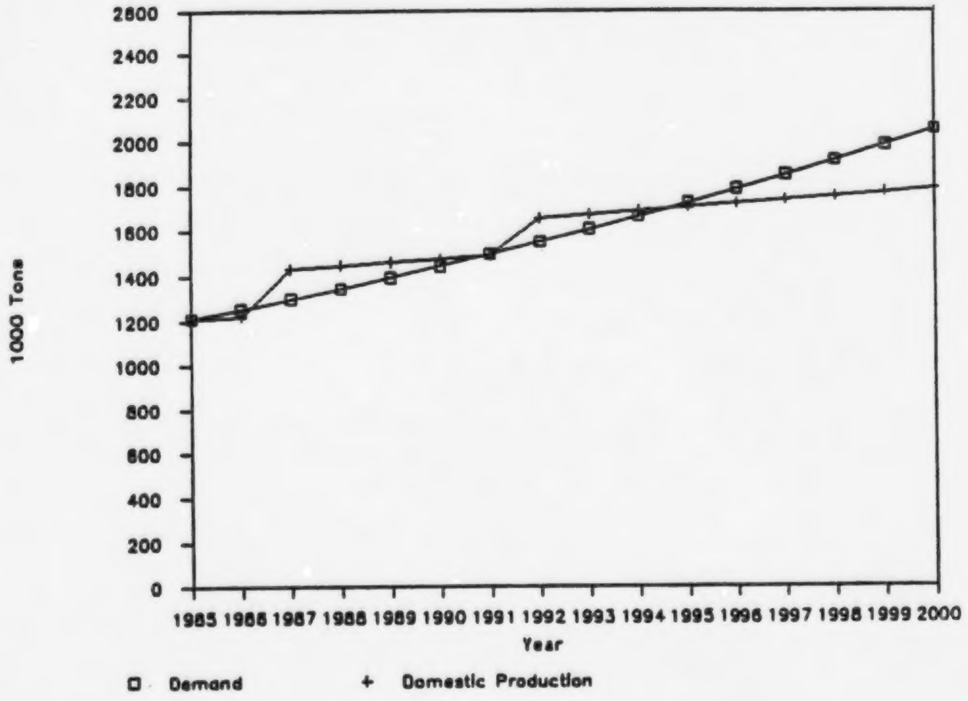


Figure F.4.39. U.S. NORTH CENTRAL LWC-PAPER DEMAND AND DOMESTIC PRODUCTION

In addition to the domestic (North Central) producers, the other U.S. regions and European producers are the major competitors in the market area (Table T.4.18a).

Table T.4.18a Main Competitors in the U.S. North Central LWC-Paper Markets

	1000 tons/year
1. Other U.S. Regions	50
U.S. South	
* Bowater, SC	
* Crown Zellerbach, LA	
* Weyerhaeuser, MS	
U.S. North East	
* Boise Cascade, ME	
* International Paper, ME	
2. Europe	10
* Finnpap, Finland	

The major end users of LWC-paper in the North Central region are listed in Section 4.2.7.2.

4.3.7.3 U.S. West South Central LWC-Paper Markets

In 1985 the only LWC-paper producer in the U.S. West South Central region was the James River mill at St. Francisville, LA which produced about 200,000 tons of LWC-paper. The off-shore import to the region accounted for 10,000 tons and were originated from Finland and Germany F.R. (Figure F.4.40).

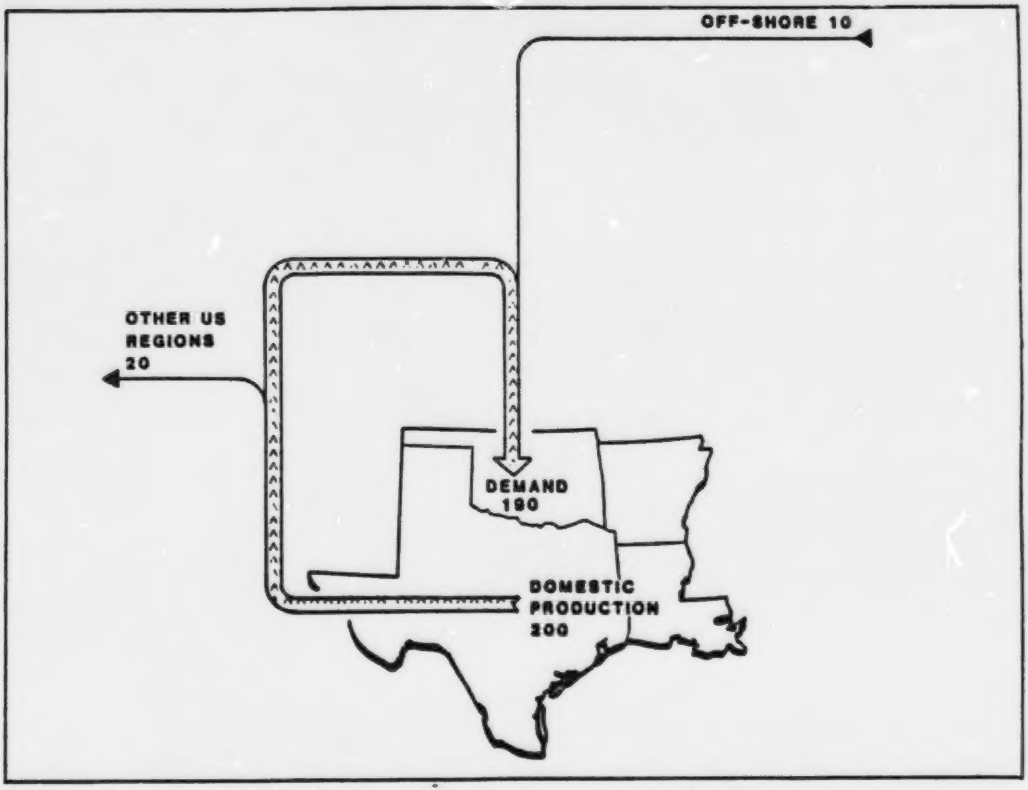

OFF-SHORE 10
OTHER US REGIONS 20
DEMAND 190
DOMESTIC PRODUCTION 200

Figure F.4.40. ESTIMATED U.S. SOUTH WEST CENTRAL LWC-PAPER DEMAND /SUPPLY STRUCTURE IN 1985

Currently the net LWC-paper shipments to other U.S. regions from South West Central totals only 20,000 tons, but will grow remarkably after the International Paper mill, Pine Bluff, AR start-up. Additionally James River, St. Francisville, LA mill has plans to increase the production of LWC-paper. The capacity development is summarized in Table T.4.19.

Table T.4.19. U.S. West South Central Domestic LWC-Paper Capacity

		1000 tons/year
Capacity in 1986:		
James River, St. Francisville, LA		220
Announced/planned new capacity		
International Paper, Pine Bluff, AR	1986	180
James River, St. Francisville, LA	1992	100
Net improvements		50
Total		340
TOTAL ESTIMATED CAPACITY IN YEAR 2000		560

Although the printing/publishing sector is growing fast in this region, in terms of tonnage the demand for LWC-paper will remain relatively low: 190,000 tons in year 1985, estimated 290,000 tons in year 1991 and 370,000 tons in year 2000. The net export will grow and amount to 100,000 tons in year 1991 and further to 160,000 tons by year 2000.

In the near future, James River and International Paper, will be the strongest competitors on the U.S. West South Central LWC market.

The major LWC-paper end users are listed in Section 4.2.7.3.

4.3.7.4 Summary of the Western U.S. LWC-Paper Markets

The Western U.S. LWC-paper markets are summarized in Table T.4.20.

Table T.4.20 Summary of Western U.S. LWC-Paper Import Demand

Region	1985	1991	2000
	1000 tons/year		
U.S. West	330	500	700
U.S. North Central	60	300	380
U.S. West South Central	-10	-110	-160
TOTAL	380	690	920

The growth in the import demand on the Western U.S. market area will be about 600,000 tons by the year 2000 and most of it will be experienced in the U.S. West region.

4.3.8 Pacific Rim LWC-Paper Markets

4.3.8.1 Japanese LWC-Paper Markets

Currently the Japanese coated groundwood consumption is 600,000 tons per year of which 340,000 tons is LWC-type paper (B3-grade). The LWC-paper production capacity is basically higher than the domestic consumption, as shown in Table T.4.21 but because part of the production of other grades than LWC-paper, there is currently a gap between the domestic production and demand. This gap was filled in 1985 by Finnish and German producers (Figure F.4.41).

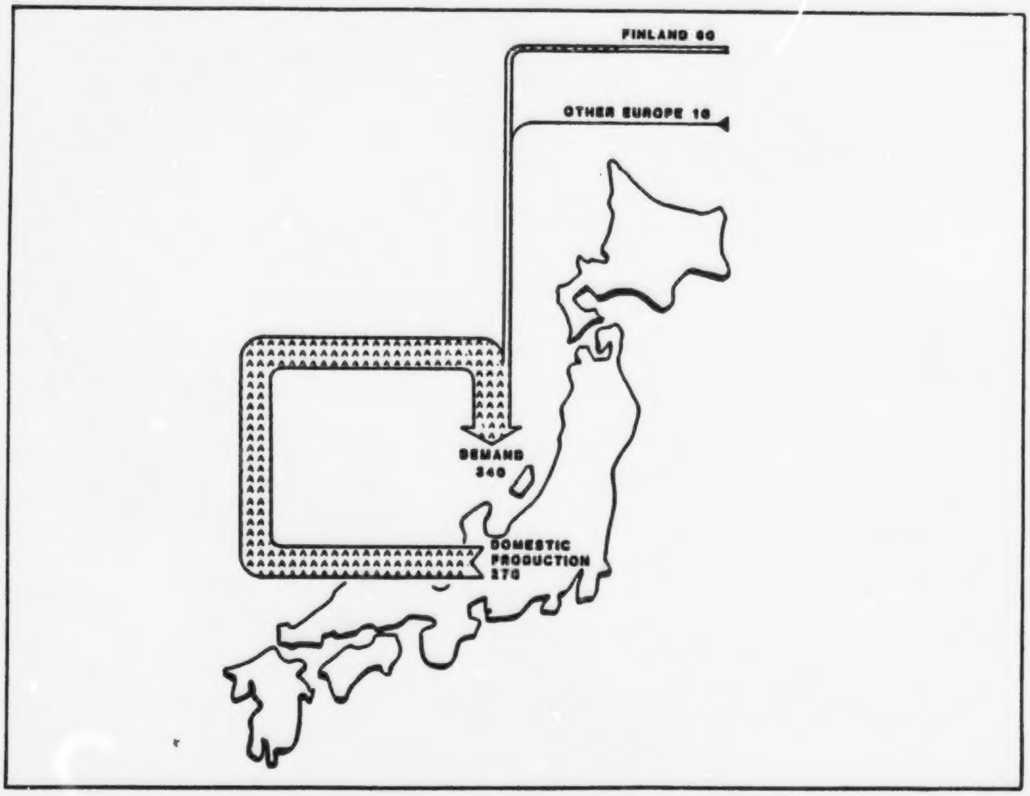


Figure F.4.41. LWC-PAPER DEMAND/SUPPLY STRUCTURE IN JAPAN IN 1985

Table T.4.21 Domestic LWC-Paper Capacity in Japan

Producer		1000 tons/year
Honshu Paper Mfg. Co. Ltd., Fuji City		5
Jujo Paper Mfg. Co. Ltd., Ishinomaki		180
Kanzaki Paper Mfg. Co. Ltd., Tomioka		120
Maruzumi Paper Mfg. Co. Ltd., Kawanoe		65
Announced/planned capacity changes:		
Sanyo-Kokusaku So. Ltd., Iwakuni	1990	105
Taio Paper Mfg. Co. Ltd., Mishima	1995	100
Net Improvements		80
Total		285
TOTAL ESTIMATED CAPACITY IN 2000		700

The somewhat fast growth especially in the catalog and insert/mailer sector, 7 percent/year during the years 1985-1995, will boost the consumption of LWC-paper. We have estimated that the LWC-paper demand will grow 6.3 percent/year up to year 1995 and about 5 percent/year from 1995 to year 2000.

Sanyo-Kokuskau Co. and Taio Paper Mfg. Co. have plans to increase their LWC capacity by about 100,000 tons/year each. Miscellaneous net improvements will further increase the capacity by about 80,000 tons. The average net import demand of LWC-paper seems to remain at the current 100,000 tons/year level.

The main off-shore competitors on the Japanese market are Finnpap from Finland and Feldmühle from Germany, F.R.

4.4.8.2 LWC-Paper Markets in the Republic of Korea

Currently the annual consumption of LWC-type paper in the Republic of Korea is 40,000 tons and all of that is supplied by domestic producers, namely Hong Won Paper Mfg. Co. and Shinmoorim Paper Mfg. Co. (Table T.4.21).

Table T.4.21a Domestic LWC-Paper Capacity in Republic of Korea

Current Producers	1000 tons/year
Hong Won Paper Mfg. Co. Ltd.	49
Shinmoorim Paper Mfg. Co. Ltd.	60
TOTAL	109

No announced/planned new capacity
Domestic capacity and demand is assumed to be in equilibrium

The demand is estimated to grow to about 80,000 tons by year 2000 and will be covered by domestic producers.

4.3.8.3 LWC-Paper Markets in the People's Republic of China

In 1985 the LWC-paper demand in the People's Republic of China was only 5000 tons, all of it imported from Finland. There is no domestic LWC-paper production capacity in China.

The magazine and export oriented advertising industry will most likely be the main driving force behind the future growth of the LWC-paper demand. We have estimated that in year 2000 the consumption of this grade will be about 60,000 tons, and it will be supplied by foreign producers.

The main competitors in these markets will be the Finnish and German LWC-paper producers.

4.3.8.4 Summary of LWC-Paper Markets in the Pacific Rim Countries

The net imports demand of LWC-paper in the Pacific Rim countries is summarized in Table T.4.22.

Table T.4.22. Pacific Rim LWC-Paper Imports Demand

Region	1000 tons/year		
	1985	1991	2000
Japan	70	110	140
Republic of Korea	-	-	-
People's Republic of China	25	25	60
Total	75	135	200
Australia	90		
New Zealand	10		
Singapore	5	Not Calc.	Not Calc.
Hong Kong	5		
Malaysia	4		
Indonesia	2		
Taiwan	2		
Thailand	2		
Philippines	2		
TOTAL	197		

4.3.9 Summary of LWC-Paper Markets

The imports demand of LWC-paper to the selected market regions will grow from the 400,000 tons/year level to about 1.1 million tons/year by the turn of the century. The major competition in the selected LWC-paper markets is summarized in Table T.4.23.

Table T.4.23. Main Competitors in the LWC-Paper Markets

Market Area	US Pacific North West	US South	Scandinavia & Germany	
1. Domestic	-	-	-	x)
2. U.S. West	100	300	20	
3. U.S. North Central	-	50	10	
4. U.S. West South Central	-	200	10	
5. Japan	-	-	60	
6. Korea	-	-	-	
7. China	-	-	-	
TOTAL	100	550	105	

x) The supply to the domestic market originates from East Canada and Eastern U.S.

The market supply/demand outlook is presented in Table T.4.23.A for the selected market areas.

Table T.4.23.A. LWC Market Outlook in Selected Market Areas

	Demand			Prod. (1000 tons/year)			Import			Export		
Market Area	'85	'92	'00	'85	'92	'00	'85	'92	'00	'85	'92	'00
Domestic	27	45	60	0	0	0	27	45	60	0	0	0
U.S. West	400	600	1000	100	115	300	320	485	700	0	0	0
U.S. North Central	1210	1500	2050	1150	1630	1670	60	0	380	0	0	0
U.S. West South Centr.	190	290	370	200	390	530	10	0	0	20	100	160
Japan	340	550	770	270	500	670	70	50	100	0	0	0
Rep. of Korea	40	60	80	40	60	80	0	0	0	0	0	0
People's Rep. of China	5	30	60	0	0	0	5	30	60	0	0	0
TOTAL	2232	3075	4390	1770	2695	3250	492	610	1300	20	230	160

4.4 Solid Bleached Board

4.4.1 Classification of Bleached Paperboards

Since the terminology between Europe and North America varies and is somewhat confusing, a brief description of the grades and abbreviations used in this report is given below:

Solids Bleached Sulfate (SBS): A bleached board produced entirely of bleached chemical (virgin) pulp. Commonly SBS is a single-ply board, but in some cases it may have multi-ply construction.

Solids Unbleached Sulfate (SUS): Unbleached kraft board, normally clay coated.

Folding Boxboard (FBB): In Europe this term refers to a multi-ply folding boxboard with a mechanical fiber containing middle layer. To avoid confusion, the abbreviations "FBB" in this report refers to this European type boxboard; generally the term "folding boxboard" is used in North America in reference to any boxboard used for the manufacture of folded cartons.

Clay Coated News (CCN): Recycled board with a clay coating on at least the top side.

White Lined Chipboard (WLC): This term is used in Europe in reference to recycled boxboard, which may be coated or uncoated. In North America "white lined chipboard" refers to uncoated board with a bleached chemical pulp "lining" on the top.

Based on the end use sector, bleached paperboard is divided into five main categories

1. Bleached linerboard

This small tonnage, 80,000 tons in 1985, is consumed by box-converters in corrugated box production.

2. Folding carton

This end use category includes folding carton type board used both in the food and non-food industry.

3. Liquor carton

This grade is used in milk and other liquid packaging.

4. Food service board

This category includes heavyweight cups and round vested food containers as well as plate, tray and dish stock.

5. Other bleached board

Into this category fall all the other bleached board grades.

Production and consumption of these grades in the U.S. is shown in Table T.4.24.

Table T.4.24. Solid Bleached Paperboard Demand/Supply Structure in the U.S. (1985)

Category	Cons.	Prod.	Imp.	Exp.
	1000 tons/year			
Bleached linerboard	80	80	-	-
Folding carton	1,590	1,680	10	110
Liquid carton	590	920	-	350
Food service board	640	640	-	-
Other Bl. Board	300	300	-	-
TOTAL	3,200	3,620	10	460

Folding carton, especially FBB, seems to be the most attractive bleached board grade for a potential Albertan producer due to the following reasons:

- **Large market volumes**
- **Non-export oriented product in the U.S.**
- **Possibilities to use mechanical (CTMP) pulp**
- **Opportune markets also in the Pacific Rim countries**

4.4.2 Folding Carton End Uses

Both food and non-food end use applications of folding carton are given in Table T.4.25.

Table T.4.25. U.S. Shipments of Folding Cartons by End Use in 1985 (% of tonnage)

End Use	% of total tonnage	
Food:		
Dry food	23.5	
Wet food	12.4	
Beverages	12.8	
Biscuit & crackers, baked goods	9.8	
Canada and confections	3.5	
Food Total		62.0 %
Non-Food:		
Soap	6.8	
Medical product	6.1	
Hardware, appliances and auto supplies	3.5	
Cosmetics	2.2	
Retail and laundry	5.1	
Paper goods	6.6	
Tobacco	4.5	
Sporting goods and toys	1.2	
Textiles and apparel	1.1	
Other	0.9	
Non-Food Total		38.0%
GRAND TOTAL		100.00%

The fastest growing end use applications are: medical and cosmetics packaging, dry and frozen food packaging and paper goods. The share of applications in the textile, hardware and soap industry are on the other hand declining.

In the Pacific Rim countries the non-food sector dominates the use of folding carton.

4.4.3 World Folding Carton Trade

As shown in Figure F.4.42 world solid bleached board trade is dominated by Scandinavian producers. Net exporters were also the USA and Japan - about 100,000 tons/year each. The main target of the USA export tonnage was Canada, while Japanese shipments were designated to the various Pacific Rim countries.

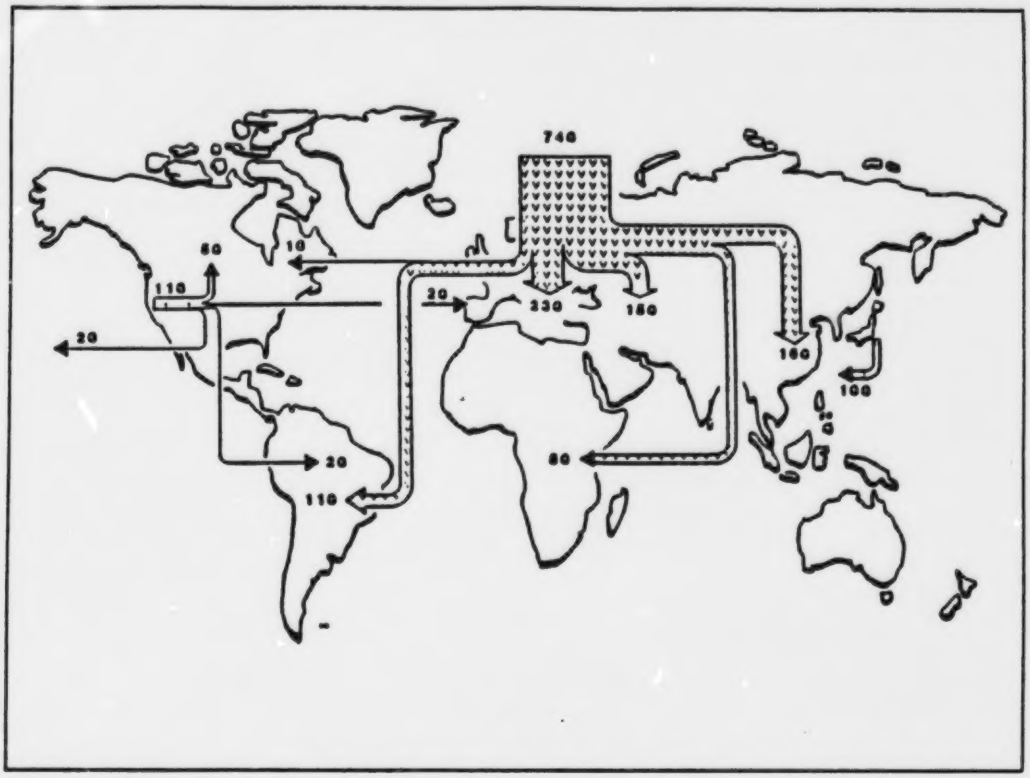


Figure F.4.42. MAJOR BLEACHED BOARD TRADE FLOWS IN 1985

The current bleached board capacity (see Appendix A.4.5) in the world is about 12 million tons and the production about 10.5 million tons, i.e. the utilization rate of existing production equipment is 87 percent. The worldwide growth is estimated to be only 1.6 percent/year and regionally as follows:

* North America	1.7 percent/year
* Western Europe	1.8 percent/year
* Japan	1.5 percent/year
* Other regions	1.5 percent/year

Canada is expected to maintain a higher growth rate level, slightly over 4 percent, than the rest of the North American market.

The main reason for the low growth rate for bleached board is the increasing usage of recycled board. The forecasted demand to year 2000 and production capacity to 1991 is shown in Figure F.4.43. The capacity utilization is estimated to stay at the current 87 percent level for the next five years.

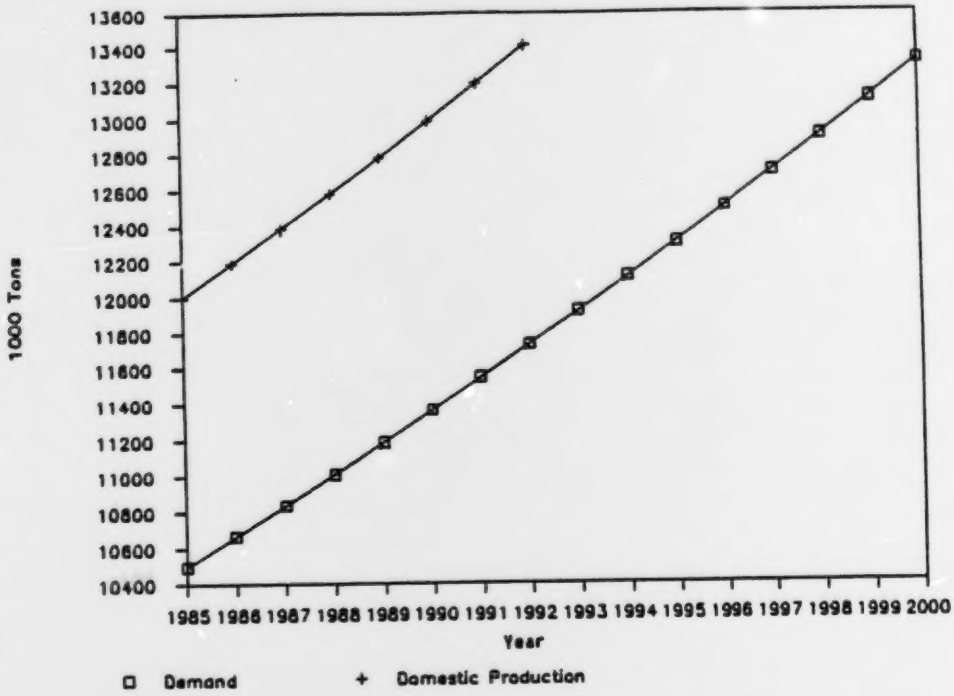


Figure F.4.43. WORLD BLEACHED BOARD DEMAND AND CAPACITY

The price development for cartonboard stock in the eastern United States market is depicted in Figure F.4.44. Referring to this figure, the following observations can be made:

* The price of clay coated news (CCN) follows the price of SBS in the U.S., consistently at a 25 percent to 35 percent lower level.

* The price of SBS in the U.S. tends to adjust to the price of market chemical pulp.

* The premium prices of SBS are in the range of US $60/ton to $200/ton higher than that of chemical pulp.

* In the U.S. increases in price of SBS have been less than increases in consumer price index (CPI). During the period of 1977-82 the CPI increased by 60 percent while the price of SBS increased by 53 percent. The difference is even more distinctive during the 1982-87 period, when the CPI increased a modest 13 percent while the price of SBS dropped by 9 percent.

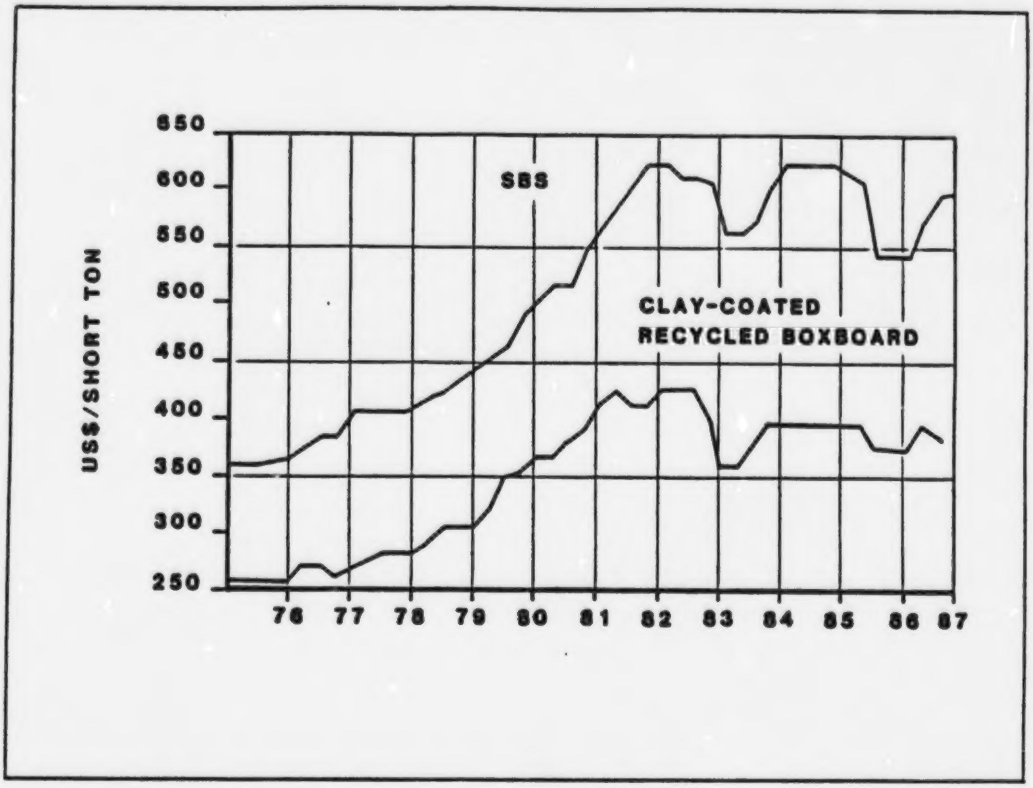


Figure F.4.44. FOLDING BOXBOARD PRICES IN THE U.S.A.

FBB produced in Alberta would be expected to compete with SBS or CCN depending on the business strategy adopted. Some conclusions based on the observation above are.

- FBB price will most likely follow North American CCN and SBS prices.
- FBB will normally to sell at premium to market pulp.
- It is assumed that FBB prices will stay somewhere between those for SBS and CCN. Results from the field surveys indicate that North American converters expect that FBB will sell at a 10-15 percent discount compared to SBS prices.

Current prices for FBB and CCN in the United States are running at USD 660-720 per ton and USD 440/ton, respectively.

4.4.4 Quality of Folding Carton

The main desired characteristics of folding carton are: good printability, high stiffness and good scoring and folding properties. Low density is also a desirable feature, because it results in a board with less substance (basis weight) while still meeting the required properties. Good bonding ability is an additional feature necessary for multi-ply folding boxboard.

The European type of folding boxboard, FBB, is a multi-ply board which normally consists of at least three layers of fiber:

* Chemical pulp for the top layer
* Mechanical pulp for the middle layer
* Chemical pulp for the back layer

Multi-ply folding boxboards are being produced from virgin fiber in a number of European mills.

Typical examples of producers of top quality FBB are:

* Feldmühle AG Baienfurt, W. Germay
* Papyrus Kopparsfors AB, Fors, Sweden
* Metsä-Serla (TAKO), Tampere, Finland

Some of these producers, especially TAKO and Feldmühle are fairly well recognized by North American converters.

Examples of top quality producers of solid bleached boards, SBS, are Westvaco in Covington, VA and AB Iggesund Bruk, Iggesund, Sweden. Most competition for a potential Albertan board would be solid bleached board produced by a number of U.S. manufacturers.

4.4.5 Domestic Folding Carton Markets

The current Canadian producers of bleached paperboard are located in Eastern Canada: CIP Inc., at La Tuque, PQ, Fraser Inc. at Edmundston, NB and Cascade Industries at Jonquiere, PQ. The Canadian production of folding carton in 1985 was about 90,000 tons - 80,000 tons were shipped to domestic converters and about 10,000 tons were exported. Simultaneously the Canadian imports from the U.S. were about 55,000 tons. The Canadian folding carton consumption in 1985 reached 135,000 tons. However, due to the concentration of the folding carton converting industry to Quebec and Ontario, the demand in the Prairie provinces and in British Columbia was only about 10,000 tons. Most of this demand was supplied by the Southern U.S. producers.

The total folding carton demand, including solid bleached board and recycled board, is estimated to grow in Canada by 1 percent per year. However, the clear trend away from the recycled board, 1 percent per year decline in consumption, results in a 4 percent growth in solid bleached board demand. In terms of tonnage the folding carton consumption in Canada will reach 240,000 tons by the year 2000. In Western Canada the estimated demand in 2000 is about 20,000 tons. There are no plans to start folding carton production in Western Canada.

The main converters of folding carton in the Western Canada region are:

- Ace Productions Ltd., Vancouver, B.C.
- Lawson Graphics Manitoba Ltd., Winnipeg, MB
- Lawson Graphics Pacific Ltd., Richmond, BC
- Sommerville Belkin Industries Ltd., Edmonton, AB
  Burnaby and Vancouver, B.C and
  Winnipeg, MB
- Western Paper Co., Ltd., Winnipeg, MB
- Westfold Cartons Ltd., Edmonton, AB

4.4.6 U.S. West of Mississippi Folding Carton Markets

The following discussion and forecasts have been based on indications and information received from North American cartonboard converters and on end use trends combined with economic growth trends. The following trends are expected:

* An increase of SBS and FBB type board is expected. At the same time the demand for recycled board is diminishing. This is primarily because of higher requirements on both runnability and printability.

* Major investments in the consistent quality of the printing surface will provide improved market opportunities. The smoothness of the surface is regarded more important than gloss.

Additionally supporting a favorable development of the cartonboard market are the facts that

* The cartonboard provides economic space utilization in distribution and shelf-display.

* The cartonboard offers flexibility in design and an economic alternative for packaging.

* Folded cartons are easier to dispose by the consumer. Competing materials such as plastic cause disposal problems.

Factors limiting a faster demand growth are mainly a harder competition from plastics and also tendencies toward lighter grades, which will effect the tonnage growth.

4.4.6.1 U.S. West Folding Carton Markets

In the U.S. West region about 170,000 tons of folding carton was produced in 1985: about 150,000 tons by Potlatch, Lewiston, ID and the remaining 20,000 tons by Weyerhaeuser Co. Longview, WA, the Weyerhaeuser production being milk carton. Additionally 75,000 tons were shipped to this region from the other regions - mainly U.S. South (Figure F.4.45).

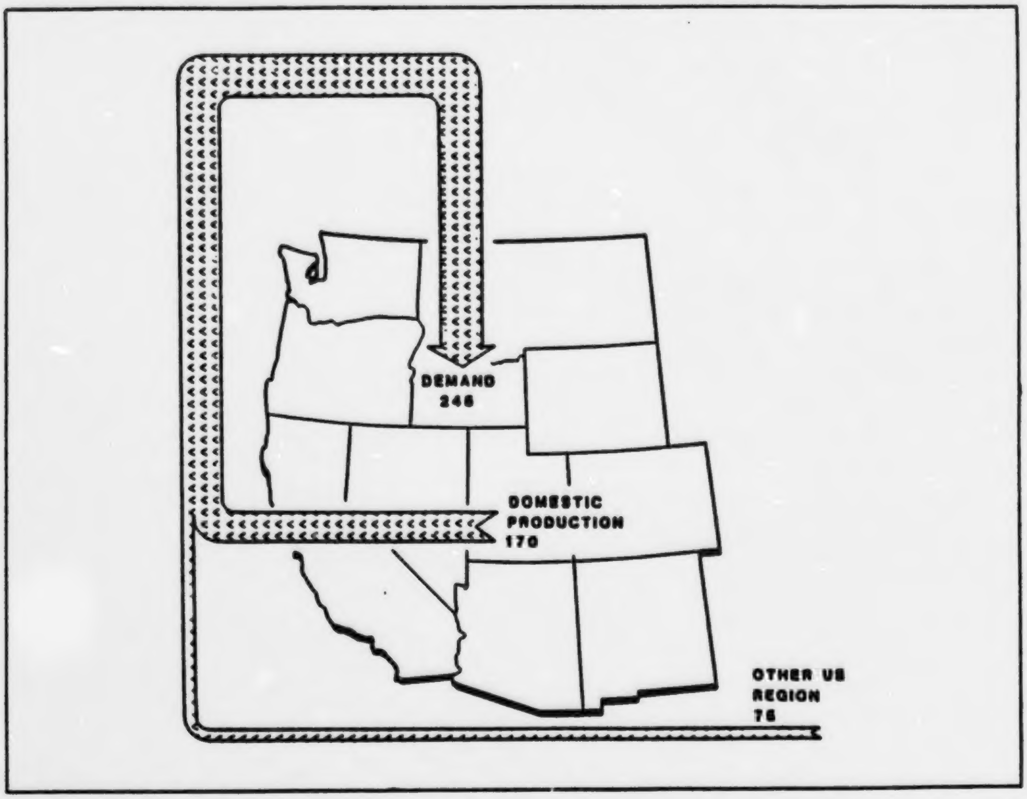


Figure F.4.45. ESTIMATED U.S. WEST FOLDING CARTON DEMAND/SUPPLY STRUCTURE IN 1985.

The demand is forecasted to grow by 0.8 percent/year and to reach a 270,000 ton level by year 2000 (Figure F4.46). There are no announced or planned new machines coming on stream in the U.S. West. Miscellaneous net improvements will, however, increase the capacity to 210,000 tons by year 2000. The net imports demand is estimated to remain at the current level.

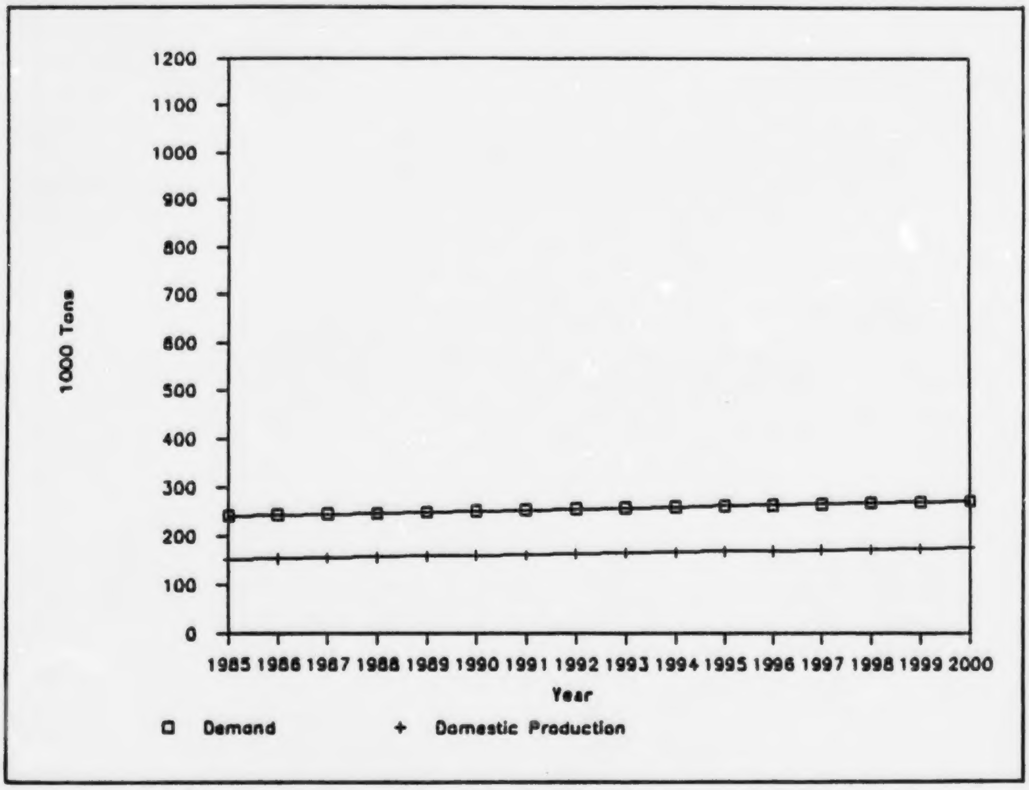


Figure F.4.46. US WEST FOLDING CARTON DEMAND AND PRODUCTION

Also in the future the U.S. South folding carton producers, in addition to Potlach and Weyerhaeuser, will be the main competitors on the U.S. West market.

Some of the major folding carton end users are listed in Table T.4.26.

Table T.4.26. U.S. West Major Folding Carton End Users

Producer	Capacity 1000 ton/year
1. Crocker Co. H.S., San Bruno, CA	25
2. Pacific Paperboard Products Inc., San Francisco, CA	20
3. Coast Carton Corp., Industry, CA	10
4. Consolidated/Eureka Paperbox Inc., Gordon Grove, CA	10
5. Los Angeles Paper Box and Board Mills, Los Angeles, CA	10
6. Pacific Coast Packaging Corp., Vernon, CA	10
7. Ridgeway Packaging Corp., Redmond, WA	10

End users are clearly concentrated in to California - Los Angeles and San Francisco.

4.4.6.2 U.S. North Central Folding Carton Markets

The U.S. North Central region is a large consumer of folding cartons, 60 percent of the U.S. total demand. However, the domestic productions is fairly small, only 140,000 tons in 1985 - supplier being International Paper, Moss Point, MI. The main carton flow to this region came from the U.S. South region (Figure F.4.47).

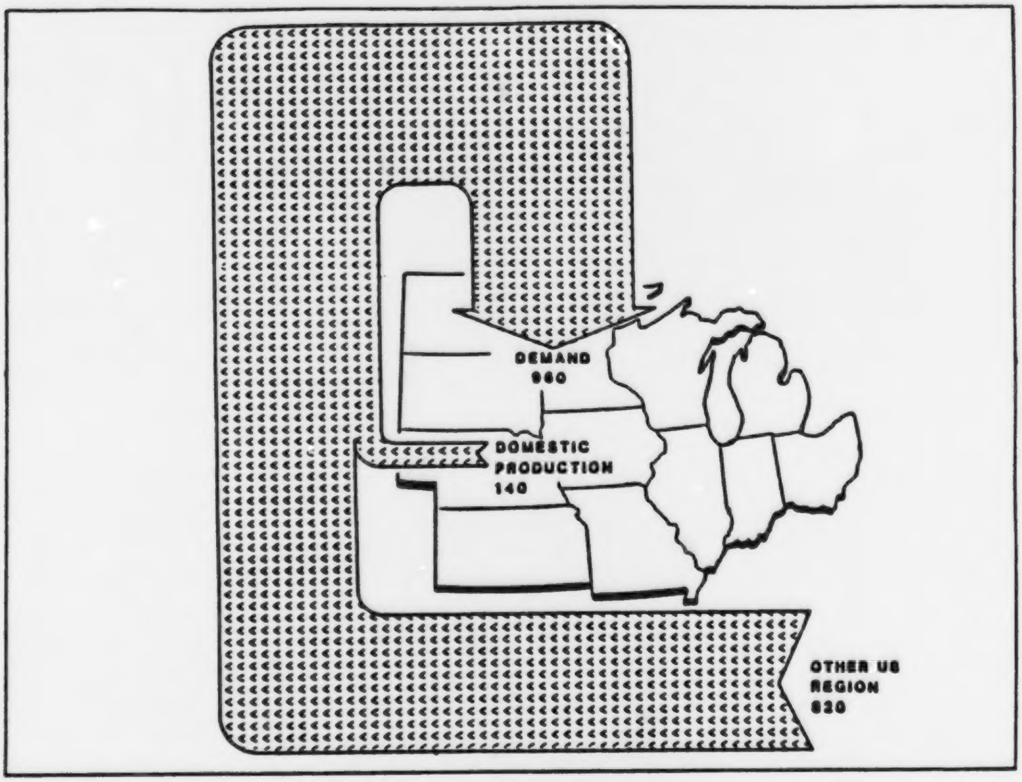

DEMAND
960
DOMESTIC
PRODUCTION
140
OTHER US
REGION
820

Figure F.4.47. ESTIMATED U.S. NORTH CENTRAL FOLDING CARTON DEMAND/SUPPLY STRUCTURE IN 1985.

We have estimated that the capacity in the market area will grow to 260,000 tons by year 2000 due to the start-up of a new machine in the early 90's. Also in the North Central region the growth in the folding carton demand will be low , 0.9 percent/year. The imports demand will remain at the current level (Figure F.4.47a).

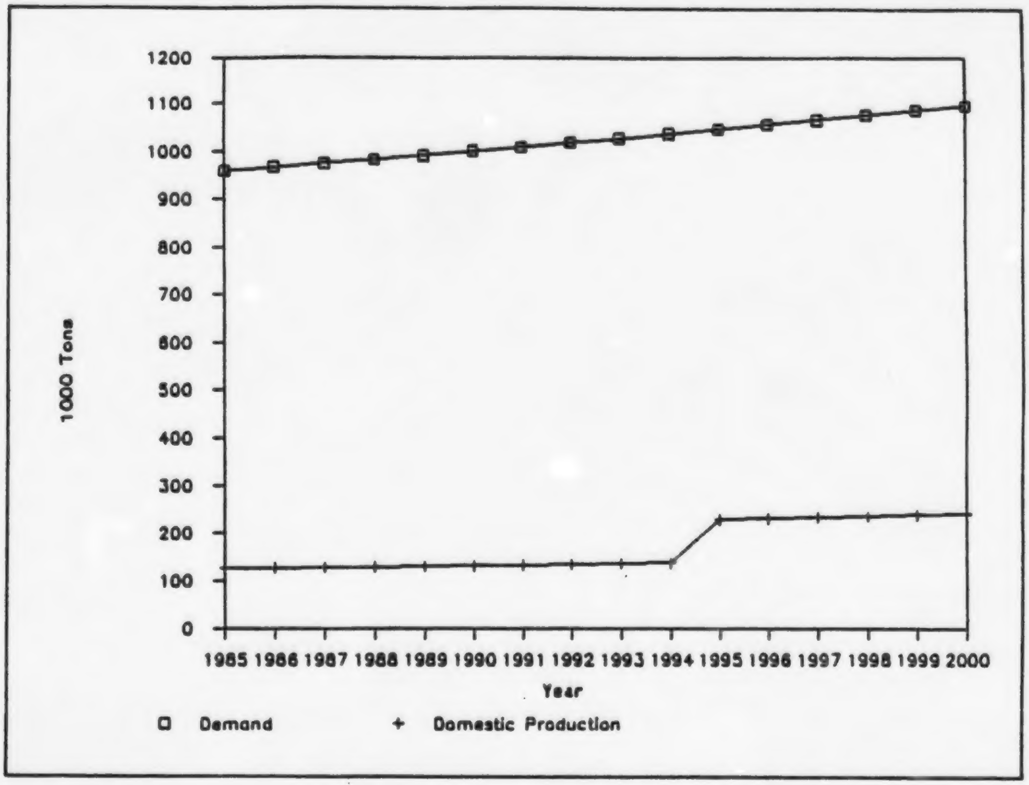


Figure F.4.47a. US NORTH CENTRAL FOLDING CARTON DEMAND AND PRODUCTION

Major folding carton end users in the North Central region are listed in Table T.4.27.

Table T.4.27. Major U.S. North Central Folding Carton End Users

Producer	Capacity 1000 t/a
1. Jefferson Smurfit Corp., Alton, IL	275 (21 plants)
2. Packaging Corp. of America, Evanston, IL	140 (6 plants)
3. Field Container Corp., Elk Grove Village, IL	60
4. Green Bay Packaging, Green Bay, WI	25
5. RPM Board & Carton Corp., Rosemont, IL	25
6. Handschy Industries, Chicago, IL	25
7. Golbert Packaging Corp., Melrose Park, IL	10
8. Colunet Carton Co., South Holland, IL	10
9. Bud and Fletcher Co., Kansas City, MO	10
10. The Garber Co., Ashland, OH	10
11. Velpaco, Batt Creek, MI	10
12. Vaplan Paper Box Co., East St. Paul, MN	10
13. Indiana Carton Co., South Bend, IN	10
14. National Folding Carton, Corp, North Kansas City, MO	10

4.4.6.3 U.S. West South Central Folding Carton Markets

The U.S. West South Central Region is currently self-sufficient in regard to folding carton. The "domstic" production in 1985 was 140,000 tons - suppliers being Potlach, McGehee, AR and Temple-Eastex, Evadale, TX - as illustrated in Figure F.4.48 and that slightly exceeds the demand.

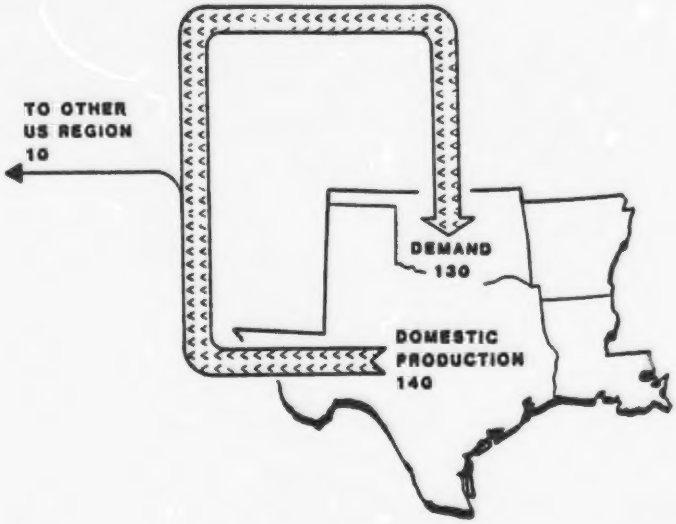

TO OTHER
US REGION
10
DEMAND
130
DOMESTIC
PRODUCTION
140

Figure F.4.48. ESTIMATED U.S. WEST SOUTH CENTRAL FOLDING CARTON DEMAND

International Paper, at its Pine Bluff, AR mill completed its modernization project in 1986 and currently produces about 40,000 tons of folding carton. Additionally we have assumed that a new machine will come on stream in the late 90's (Table T.4.28) and increase the capacity to 350,000 tons by year 2000 (Figure F.4.48a).

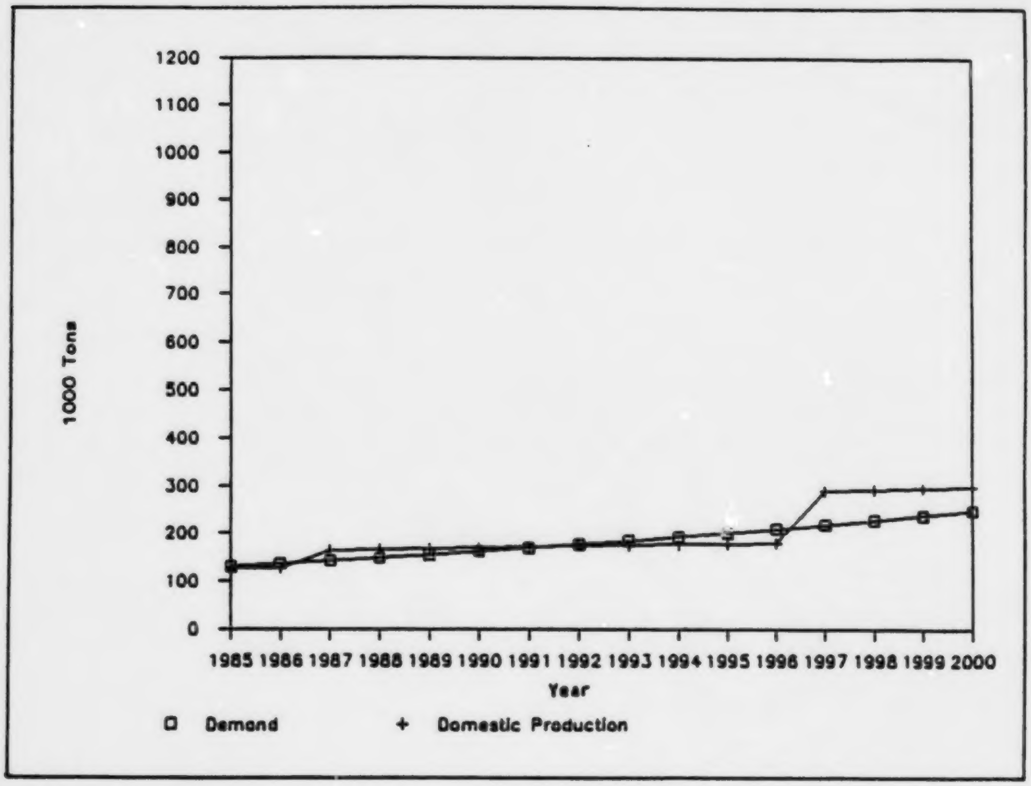


Figure F.4.48a. US WEST SOUTH CENTRAL FOLDING CARTON DEMAND AND PRODUCTION

Table T.4.28 U.S. West South Central Folding Carton Production Capacity

		1000 tons/year
Capacity in 1986:		
Potlach, McGehee, AR		100
Temple-Eastex, Evadale, TX		70
Total		170
Capacity additions		
International Paper, Pine Bluff, AR		40
Assumed new machine	1997	120
Net improvements		20
Total		180
Estimated capacity in 2000		350

The demand will grow in this market area remarkably faster than in other regions, 4.4 percent/year and will reach the level of 250,000 tons by year 2000. however, due to the assumed increase in the production capacity the region will be a net exporter of folding carton. The main competitors in the U.S. West South Central region will be the domestic producers Potlach, Temple-Eastex and International Paper and the various U.S. South folding carton producers.

A list of major folding carton converters is shown in Table T.4.29.

Table T.4.29 Major U.S. West South Central Folding Carton End Users

Producer	Capacity 1000 tons/year
Temple-Inland Inc., Diboll, TX	20 (3 plants-NC, TN, WI)
Manville Forest Products Corp., West Monroe, LA	15 (2 plants-MS, IL)
T.J. Smith Box Co., Fort Smith, AR	5
Southern Paper Box Co., Little Rock, AR	5
Clarke Printing & Packaging, San Antonio, TX	<5
Day Mfg. Co., Sherman, TX	<5

4.4.6.4 Summary of the Western U.S. Folding Carton Markets

The demand forecast of folding carton in the Western U.S. markets is shown in Table T.4.30. That information indicates that the net import demand will remain at the current level in the areas.

Table T.4.30. Folding Carton Demand in the Western U.S.

	(1000 tons/year)		
	1985	1991	2000
U.S. West	75	80	90
U.S. North Central	820	880	870
U.S. West South Central	-10	0	-50
TOTAL	885	960	910

4.4.7 Pacific Rim Folding Carton Markets

4.4.7.1 Japanese Folding Carton Markets

Japan is a major folding carton producer, 600,000 tons in 1985, and is the most important exporter of that grade in the Pacific Rim market area as shown in Figure F.4.49. Although Japan is a net exporter of folding cartons, 30,000 tons were also imported. The main sources of this import was the Pacific Rim region (South Korea, Taiwan, Indonesia), Scandinavia and USA.

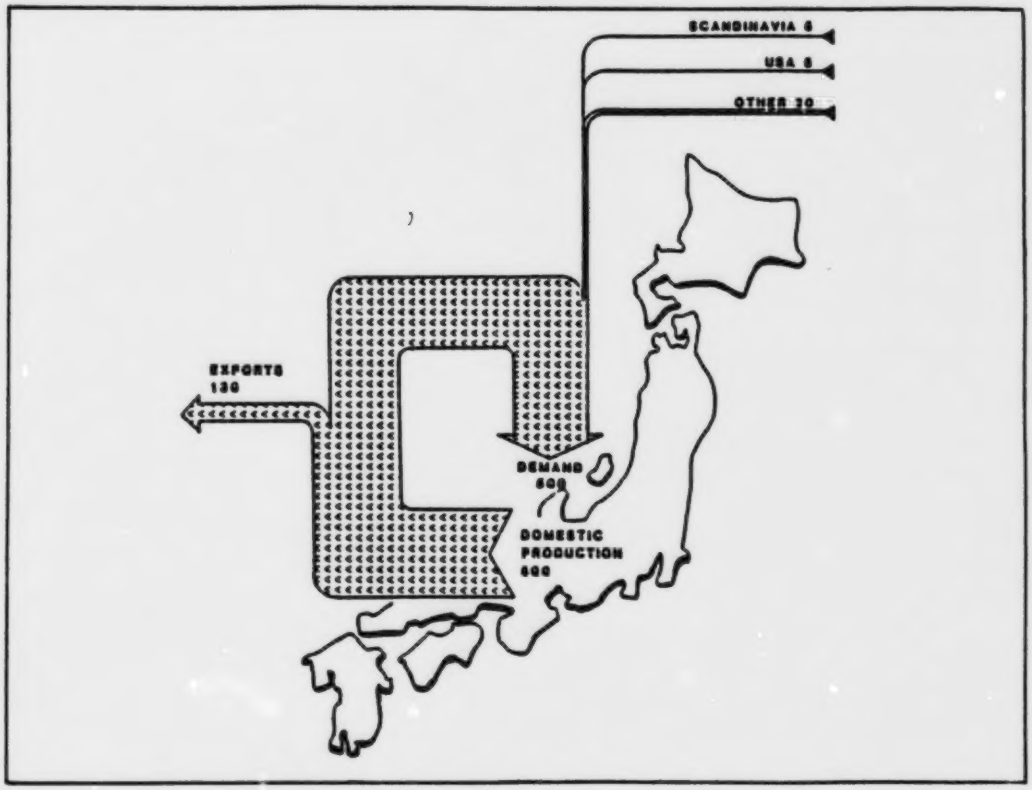

SCANDINAVIA 5
USA 5
OTHER 20
EXPORTS 130
DEMAND 500
DOMESTIC PRODUCTION 600

Figure F.4.49. FOLDING CARTON DEMAND/SUPPLY STRUCTURE IN JAPAN (1985)

Current folding carton producers are:

	1000 tons/year
Kyushu Carton Co. Ltd. Sendai-chi	50
Enshu Seishi KK	70
Ide Paper Mfg. Co. Ltd.	130
Chuetsu Pulp Industry Co. Ltd., Nochamachi	30
Daishowa Paper Mfg. Co. Ltd., Yoshinaga	200
Gojo Paper Mfg. Co. Ltd., Harada	30
Hokuetsu Paper Mills Ltd. Ichikawa	140
TOTAL	650

Folding carton demand will grow in Japan by 1.5 percent per year according to available statistics (Figure 4.49a). This growth, however, will be supplied by domestic production (partly recycled board). The imports is assumed to remain at the current 30,000/year ton level. In the high quality folding carton markets the "domestic" producers as well as other U.S. (Westvaco, Covington) and Scandinavian producers (Enso-Guzeit, Finland and Iggesund, Sweden) will be the main competitors.

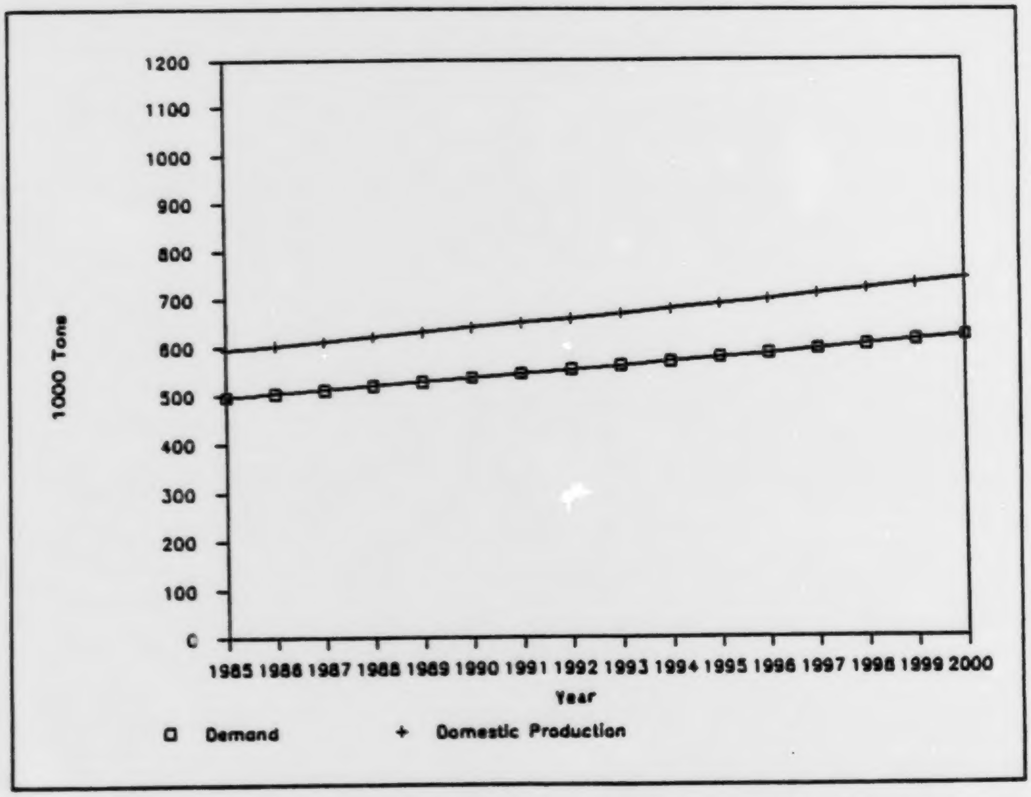


Figure 4.49a. FOLDING CARTON DEMAND AND PRODUCTION IN JAPAN

4.4.7.2 Folding Carton Markets in the Republic of Korea

Also in the folding carton sector the Republic of Korea is self-sufficient, except the small 2000 tons/year import from Japan as illustrated in Figure F.4.50. The major expansion of Serim Paper's PM 1, 70,000 tons/year that went on stream in April 1986 and Shipoong Paper's PM2 (80,000 tons/year) at its Pyong Tack mill, which was started up in October 1986 have caused a severe overcapacity in duplex board, which will be recognized also in the folding carton demand/supply structure.

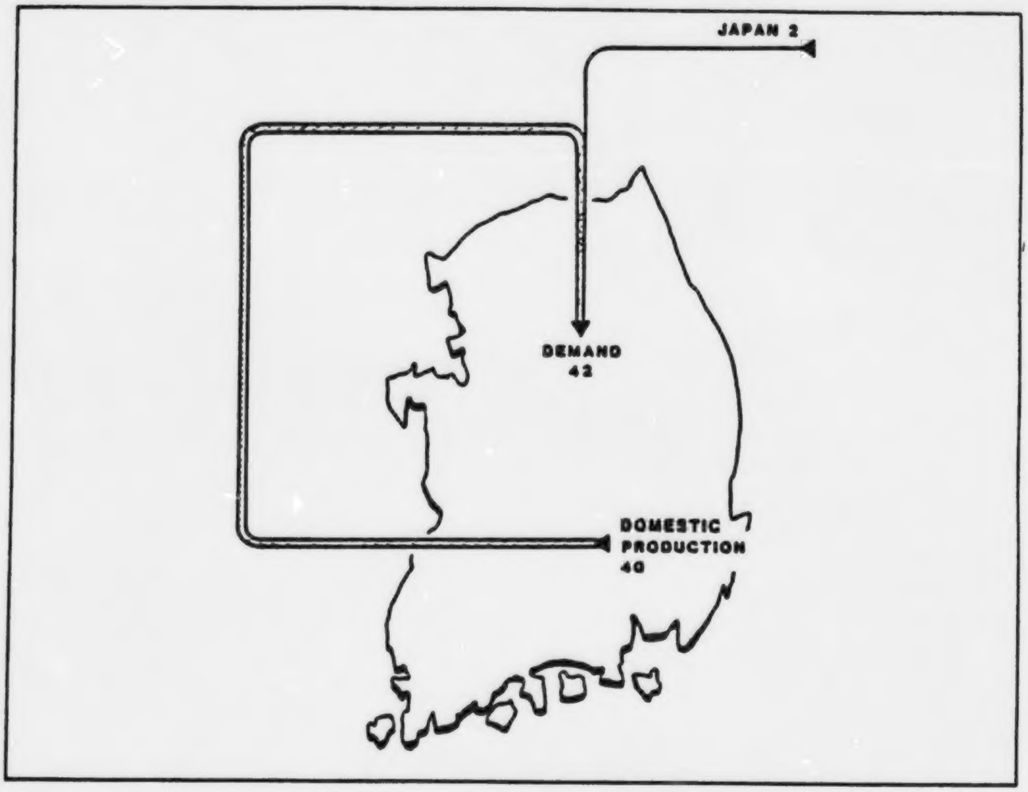


Figure F.4.50. FOLDING CARTON DEMAND/SUPPLY STRUCTURE IN THE REPUBLIC OF KOREA IN 1985

Although the demand is growing about 2 percent/year during the next 15 year, the domestic supply will cover the entire demand (Table T.4.31). As a importer of folding carton the Republic of Korea is currently and presumably in the future of minor importance as a potential market area for folding carton products.

Table T.4.31. Folding Carton (incl. Recycled) Capacity in the Republic of Korea

	1000 tons/year
1. Daehan Pulp Industries Co. Ltd.	70
2. Dong Chan Paper Mfg. Co. Ltd.	60
3. Hangchang Paper Mfg. Co. Ltd.	60
4. Kukje paper Mfg. Co. Ltd.	40
5. Serim Paper Mfg. Co. Ltd.	80
6. Onyang Pulp Co. Ltd.	10
7. Shipong Paper Mfg. Co. Ltd.	160
TOTAL INCLUDING SWING CAPACITY	480

4.4.7.3 Folding Carton Markets in the People's Republic of China

We have estimated that the folding carton-type board consumption in 1985 was about 220,000 tons, of which 200,000 tons were produced domestically (Figure F.4.51).

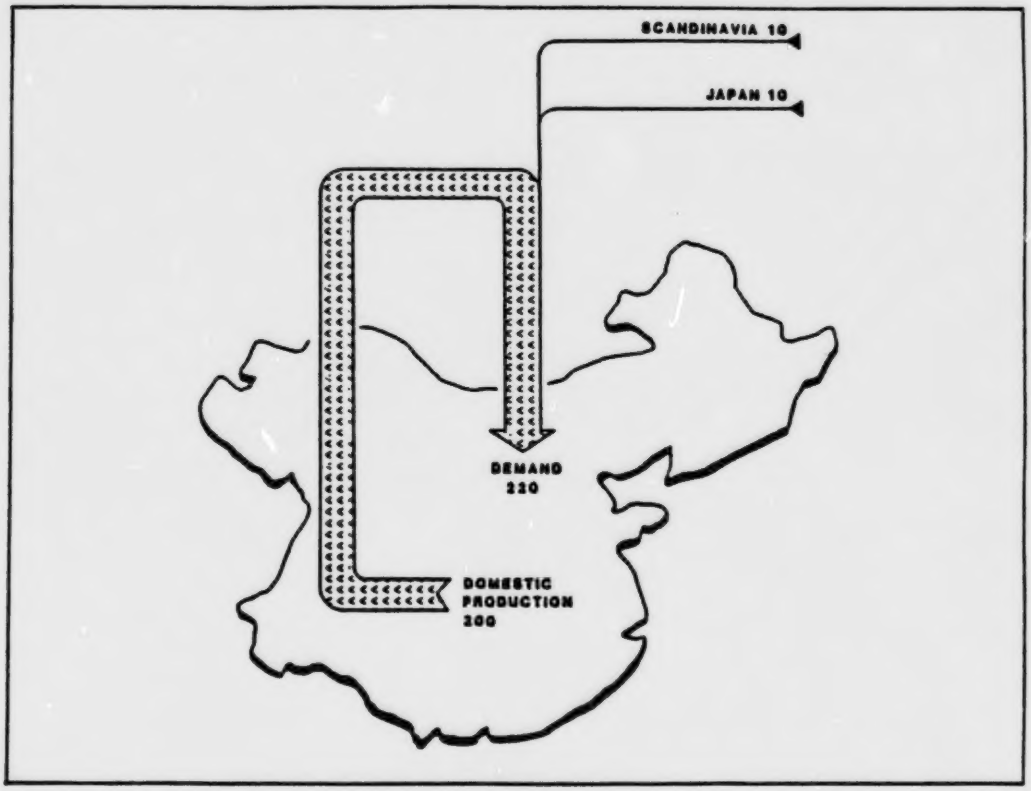

SCANDINAVIA 10
JAPAN 10
DEMAND
220
DOMESTIC
PRODUCTION
200

Figure F.4.51 FOLDING CARTON DEMAND/SUPPLY STRUCTURE IN THE PEOPLE'S REPUBLIC OF CHINA IN 1985

The demand is estimated to grow about 2 percent/year and growth will be supplied by domestic producers. The import will remain at the current 20,000 tons/year level and the main foreign competitors will be Japan and Scandinavian countries even in the future.

4.4.7.4 Summary of Folding Carton Markets in the Pacific Rim Region

The estimated folding carton imports demand is summarized in Table T.4.32.

Table T.4.32 Folding Carton Imports Demand in the Pacific Rim Market Area

	1000 tons/year 1985	1991	2000
Japan	30	30	30
Republic of Korea	-	-	-
People's Republic of China	20	20	20
TOTAL	50	50	50
Australia	40		
New Zealand	5		
Singapore	15		
Hong Kong	20	Not Calc.	Not Calc.
Malaysia	15		
Idonesia	10		
Taiwan	0		
Thailand	5		
Philippines	10		
OTHER PACIFIC RIM COUNTRIES TOTAL	120		

4.4.8 Summary of Folding Carton Markets

The demand of folding carton in the selected market areas will grow from 2.1 million tons/year level to about 2.6 million tons/year by the end of this century. However, the capacity increase in the U.S. North Central and U.S. West South Central regions results in the fact that the import demand remains at the current 0.96 million tons/year level (See Table T.4.32.A)

The main competitors in the North American folding carton markets are the U.S. South producers. In the Pacific Rim area, in addition to the U.S. producers, Scandinavian and Japanese mills are also strong competitors.

Table T.4.32.A. Folding Carton Market Outlook in Selected Market Areas

	Demand			Prod. (1000 tons/year)			Import			Export		
Market Area	'85	'92	'00	'85	'92	'00	'85	'92	'00	'85	'92	'00
Domestic	10	15	20	0	0	0	10	15	20	0	0	0
U.S. West	245	255	270	170	180	190	75	75	80	0	0	0
U.S. North Central	960	1000	1050	140	145	240	820	855	810	0	0	0
U.S. West South Centr.	130	180	250	140	180	300	0	0	0	10	0	50
Japan	500	550	600	600	650	700	30	30	130	130	130	130
Rep. of Korea	42	50	60	40	50	60	2	0	0	0	0	0
People's Rep. of China	220	250	300	200	230	280	20	20	20	0	0	0
TOTAL	2107	2300	2550	1290	1435	1770	957	995	960	140	130	180

4.5 Newsprint

4.5.1 World Newsprint Demand/Supply

Newsprint is the biggest single paper grade produced in the world today and its consumption is much more diversified than that of the value added groundwood papers such as LWC- and SC-papers. Although North America is a net exporter of newsprint (Figure F.4.52) the huge markets close to Alberta gives good basis for a closer analysis of opportunities to produce newsprint in Alberta.

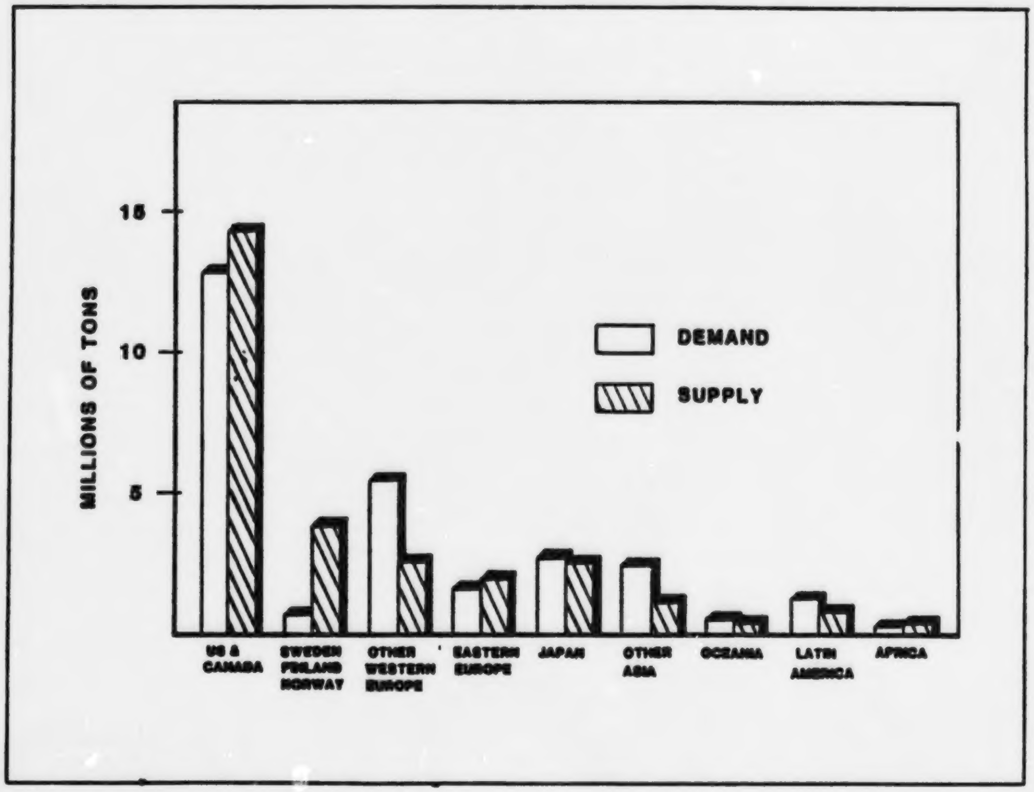


Figure F.4.52. REGIONAL NEWSPRINT DEMAND AND PRODUCTION IN 1986

The growth of world newsprint production and capacity has been steady during the past 15 years. The only exceptions have been the major grammage reduction in 1973/74 from 52 g/m^2 to 48 g/m^2 and the recession on the market in 1981/82 (Figure F.4.53). A swing back to the newspaper advertising, the growth in inserts and mailers as well as the introduction of newspapers have been the key factors in the recent healthy growth. In USA about 75 percent of the newspaper is used in regularly appearing sections of daily and weekly newspapers and the remaining, extremely fast growing 25 percent, in newspaper inserts, catalogs and in governmental printing jobs.

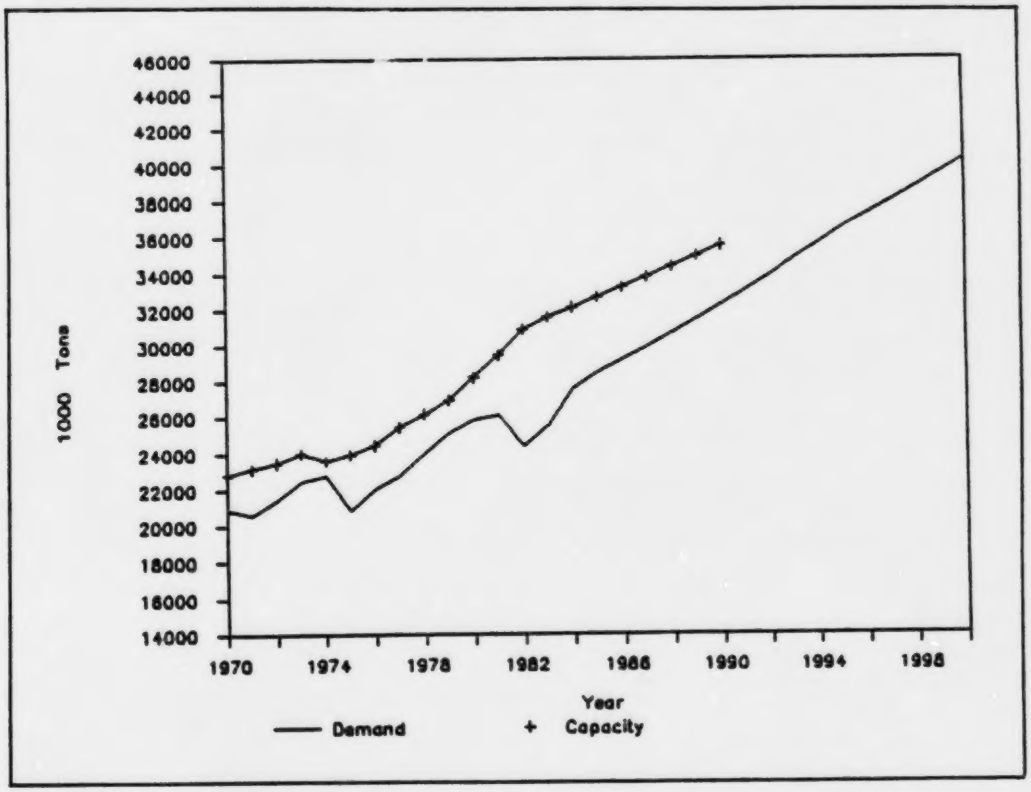


Figure F.4.53. WORLD NEWSPRINT DEMAND AND CAPACITY

Advertising index is the most important end use indicator of the newsprint demand and the advertising is accounting for an increasing share of GNP in most of the countries, the growth of newsprint demand the healthy growth is estimated to continue as newspaper advertising is increasing and newspaper is defining its position as an advertising media. The reasons for the growth in advertising are discussed in more detail in Section 4.2.

The world average annual growth rate from 1986 to 1995 is estimated to be 2.6 percent, as shown in Table T.4.33 and Figure F.4.53. The healthy growth in the developed countries is caused mainly by the increased advertising while in the developing countries also the growth of the newspaper circulation plays an important role.

Table T.4.33 World Regional Growth of Newsprint Demand

	1000 tons/year	Percent/year
North America	270	2.0
Japan	060	2.0
Western Europe	140	2.1
Other regions	360	4.4
WORLD TOTAL	830	2.6

In the late 90's the growth rate is estimated to drop to 2 percent due to saturation of markets in the western world.

From the Albertan point of view, the strong volume growth in the U.S. newsprint demand is important to recognize.

During the recession in 1981/82 many companies upgraded their small newsprint machines to uncoated groundwood grades (improved news and similar) because they had lost their competitiveness in newsprint production. These upgrades and the unexpectedly high growth in newspaper demand have improved the capacity utilization of newsprint machines during the past few years. Also during the period from 1986 to 1991 the estimated growth in newspaper demand is higher than the expected increase in capacity, which will exagerate further the newsprint capacity utilization. The list of announced/planned newsprint capacity changes clearly indicates the growing role of developing countries as newsprint producers (Appendix A.4.6).

World wide the capacity utilization rate is expected to remain slightly over 90 percent and in North America between 95 percent and 96 percent until year 1991.

The biggest long term threat a potential production of newsprint in Alberta would face is the increasing newsprint capacity in "low cost", countries such as Brazil, Venezuela, Chile, Colombia, etc.

4.5.2. World Newsprint Trade

The newsprint business, as well as other groundwood paper business, is increasingly becoming international and intercontinental. The main net exporters are Canada, Scandinavia and USA as illustrated in Figure F.4.54. On the Western European markets the Scandinavian producers are dominating while the US markets, Canadian producers play the most important role. In the Pacific Rim market, the competition is more diversified, with Canadian producers possessing the largest market share, 590,000 tons/year. In all of the three defined market areas, the main competitors to the Albertan newsprint are clearly other Canadians and Scandinavian companies.

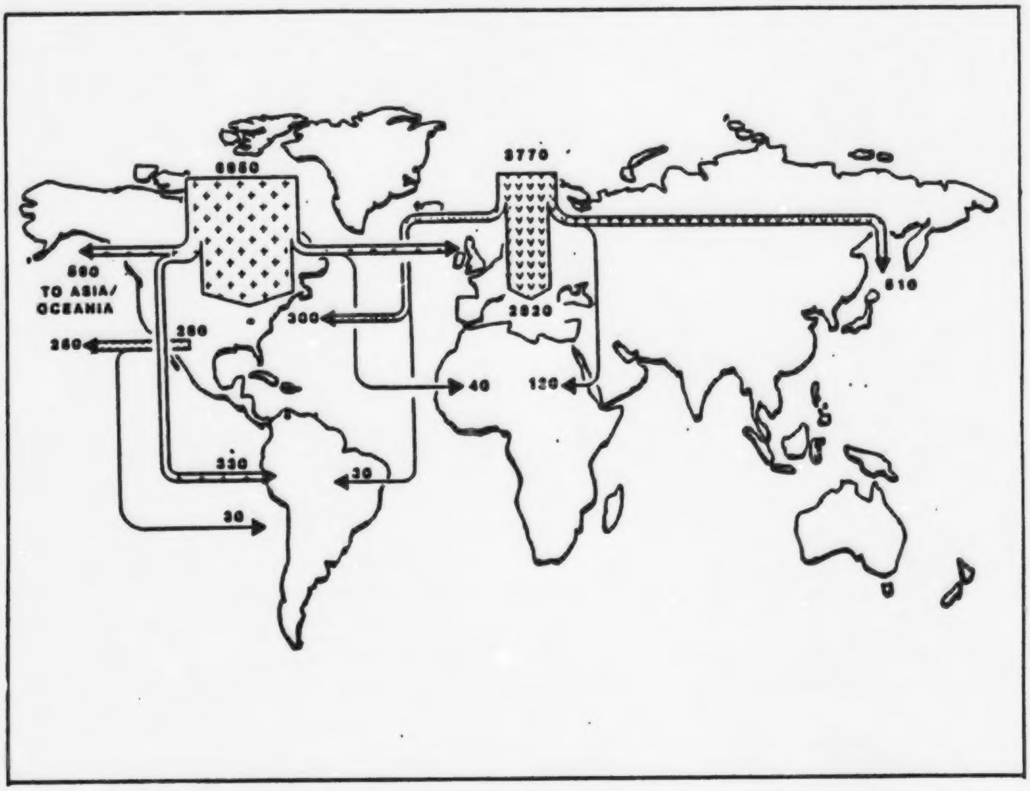


Figure F.4.54. NORTH AMERICA AND SCANDINAVIA

The internationalization of the newsprint production is most striking in Canada, where the New Zealand company Fletcher Challenge Ltd. controls both British Columbia Forest Products and Crown Forest Industries in British Columbia and additionally Blandin Paper in USA, Oji Paper Co. together with Mitsui Co. and CIP Inc. NBIP Forest Products, and Stora from Sweden the Stora Forest Products mill in Nova Scotia. U.S. companies have the following share of the Canadian newsprint industry:

1. Gaspesia Pulp and Paper Co. Ltd., Chandler, PQ
   * 49% The New York Times, NY
   * 51% Abitibi-Price Inc.

2. F.F. Soucy Inc., Riviere-du-Loup, PQ
   * Bato Co. Ltd., CT

3. F.F. Soucy Inc. Associates, Riviere-du-Loup, PQ
   - Jointly owned by
     - F.F. Soucy Inc., subs
     - Dow Jones Newsprint
     - Rexfor

4. Boise Cascade Canada Ltd. (with mills in Kenora, ON and Fort Francis, ON)
   - Boise Cascade Corp., ID
     - Kenora mill, ON
     - Fort Frances mill, ON

5. Bowater Newfoundland, Comer Brook, NF
   - Bowater Inc., CT

6. Bowater Mersey Paper Co. Ltd., Liverpool, NS
   - 51% Bowater Inc.
   - 49% The Washington Post

7. Spruce Falls Light & Power Co. Ltd., Kapuskasing, ON
   - 50.5% Kimberly-Clark, WI
   - 49.5% The New York Times

8. Ontario Paper Co. Ltd., Thorold, ON
   - Tribune Co., Chicago

9. Q.N.S. Paper, Baie Lomeau, PQ
   - Tribune Co., Chicago

In USA, Jujo Paper Co. jointly with Weyerhaeuser Co. owns North Pacific Paper Co. in Longview, WA.

For a Albertan newsprint producer, the foreign ownership of the Canadian and U.S. newsprint capacity means that part of the international trade flows are actually intracompany flows and that especially these mills have an excellent marketing network available to sell their products worldwide.

The price of newsprint in the North American and Western European markets has been very stable as illustrated in Figure F3.7. The only exception was the recession in 82/83 when the price level dropped about 70 CAD/ton. On the other hand, the price level in the Pacific Rim markets, especially in Singapore and Malaysia, is very unstable and usually remarkably lower than that of the U.S. market.

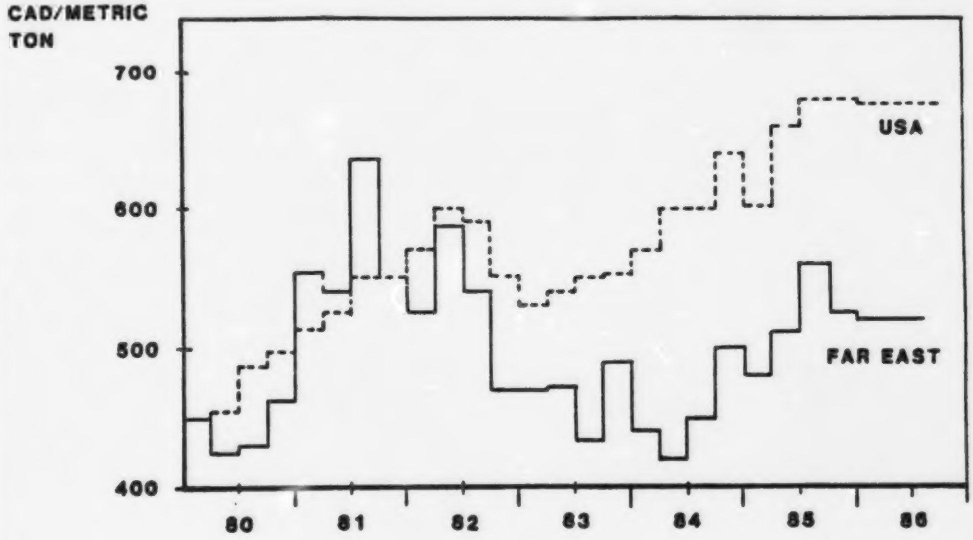


Figure F.4.55 AVERAGE QUARTERLY PRICES OF CANADIAN NEWSPRINT EXPORTS TO THE U.S. AND FAR EAST.

The price stability of newsprint on the U.S. market indicates that the main market area for the Albertan newsprint should be in United States.

4.5.3 Newsprint Quality

The standard basis weight for newsprint in the U.S. is currently 48.8 g/m^2 although the lower 46.4 g/m^2 basis weight is becoming more popular, which is also the standard basis weight in Japan. The trend towards lower basis weight is clear and will provide lower distribution costs, but significant reductions are not likely because of anticipated consumer resistance.

The common printing methods in the newspaper industry are letterpress, gravure and offset. Letterpress has been the most popular method in the U.S., but especially offset has recently gained popularity.

Rotogravure is preferred for longer runs, while offset printing offers cost efficiency for lower circulation newspaper. Both gravure and offset-printing require high quality paper compared to the letterpress method. In addition to this technological trend in the printing industry also the reduction in basis weight and the use of color printing in newspapers support a trend towards higher newsprint quality.

The use of waste paper in newsprint is a potential threat to the virgin-fiber newsprint producers. However, the higher quality requirements restrict the competition from waste-paper based newsprint.

4.5.4 Domestic Newsprint Markets

The population in the domestic market area, 7.2 million, is about 29 percent of the total Canadian population. The gross domestic production (GDP) represents, however, almost 32 percent of the total GDP in Canada. The Western Canada newsprint consumption estimate, 330,000 tons in 1985, is based on the per capita consumption in Canada corrected with the higher gross domestic production in Western Canada.

As illustrated in Figure F.4.55a the production of newsprint in 1985 was about 1.68 million tons - 1.53 million tons in British Columbia and 0.15 million tons in Manitoba (Table T.4.34). The main destination for the newsprint produced in BC is the U.S. West region which accounted for 950,000 tons in 1985. The major off-shore buyers of British Columbian newsprint are : Australia 65,000 tons, Europe 60,000 tons, South East Asia 45,000 tons, South and Central America 45,000 tons.

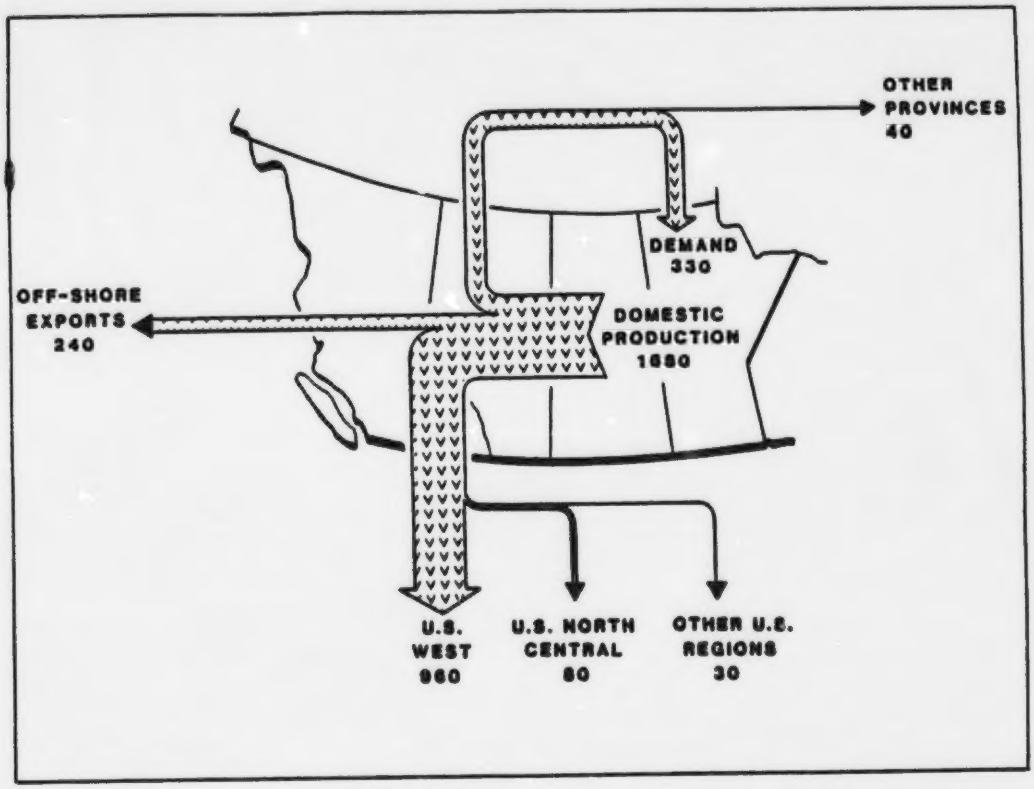

OTHER PROVINCES 40
DEMAND 330
OFF-SHORE EXPORTS 240
DOMESTIC PRODUCTION 1680
U.S. WEST 960
U.S. NORTH CENTRAL 80
OTHER U.S. REGIONS 30

Figure F.4.55a. DOMESTIC MARKETS: ESTIMATED NEWSPRINT DEMAND/SUPPLY STRUCTURE IN 1985.

About 80,000 tons of the newsprint produced in Manitoba - Abitibi-Price, Pine Falls mill - is exported to the U.S.; mainly to the U.S. North Central region. The rest, 70,000 tons is shipped to the domestic customers.

Table T.4.34. Domestic Newsprint Producers

Producer	Capacity 1000 tons/year	
Abitibi-Price Inc., Pine Falls, MB	170	
British Columbia Forest Products Ltd., Crofton, BC	440	
Crown Forest Industries, Ltd., Elk Falls, BC	450	
MacMillan Bloedel Ltd., Port Alberni, BC	300	
MacMillan Bloedal Ltd., Powell River, BC	470	
TOTAL	1830	
Capacity Additions		
Finlay Forest Industries, McKenzie, BC	150	(planned)
Crown Investment Corp., Regina, SK	175	(planned)
Quesnel River Pulp, Quesnel, BC	165	(planned)
CIP Inc., Gold River, BC		(planned)
MacMillan Bloedel, Powell River, BC		(planned)
British Columbia Forest Products Ltd., McKenzie, BC		(planned)
Miscellaneous Net Improvements	270	
Estimated Capacity Increase	630	
ESTIMATED TOTAL CAPACITY IN 2000	2460	

There are no announced major projects to increase the newsprint production capacity in Western Canada. However, a number of companies have plans to move ahead with newsprint expansions if market conditions continue to improve. We have estimated that two out of six planned projects will be realized. These, in addition to the net improvements in the existing machines, will increase the newsprint capacity to almost 2.5 million tons by 2000.

The newspaper demand is forecasted to grow in Canada by 3.7 percent per year on average. In the terms of tonnage the demand in Western Canada will grow from the current 330,000 t/a level to about 600,000 tons per year in 2000. In spite of this fairly healthy growth rate the newsprint demand is estimated to grow to almost 1.7 million tons by 2000.

4.5.5 Western U.S. Newsprint Markets

4.5.5.1 U.S. West Newsprint Markets

The estimated newsprint demand in the U.S. West region was about 2.57 million tons in 1985. The same year the corresponding domestic production was about 1.6 million tons, of which 280,000 tons were exported to the Pacific Rim countries (Japan) and to Latin America. The main exporter was North Pacific Paper Co. (Norpac), which is jointly owned by Jujo Paper Co., Japan and Weyerhaeuser Co. The difference between demand and domestic shipments was supplied mainly by Canadian newsprint producers. As illustrated in Figure F.4.55 the biggest net exporter was British Columbia with 950,000 tons, or about 50% of the total newsprint production in the province. Of the other Canadian provinces, Ontario is the second biggest net exporter, with about 80,000 tons. Sweden and Norway, were the biggest Scandinavian exporters to the market area. Only minor net amount of newsprint was shipped to U.S. West from the other U.S. regions.

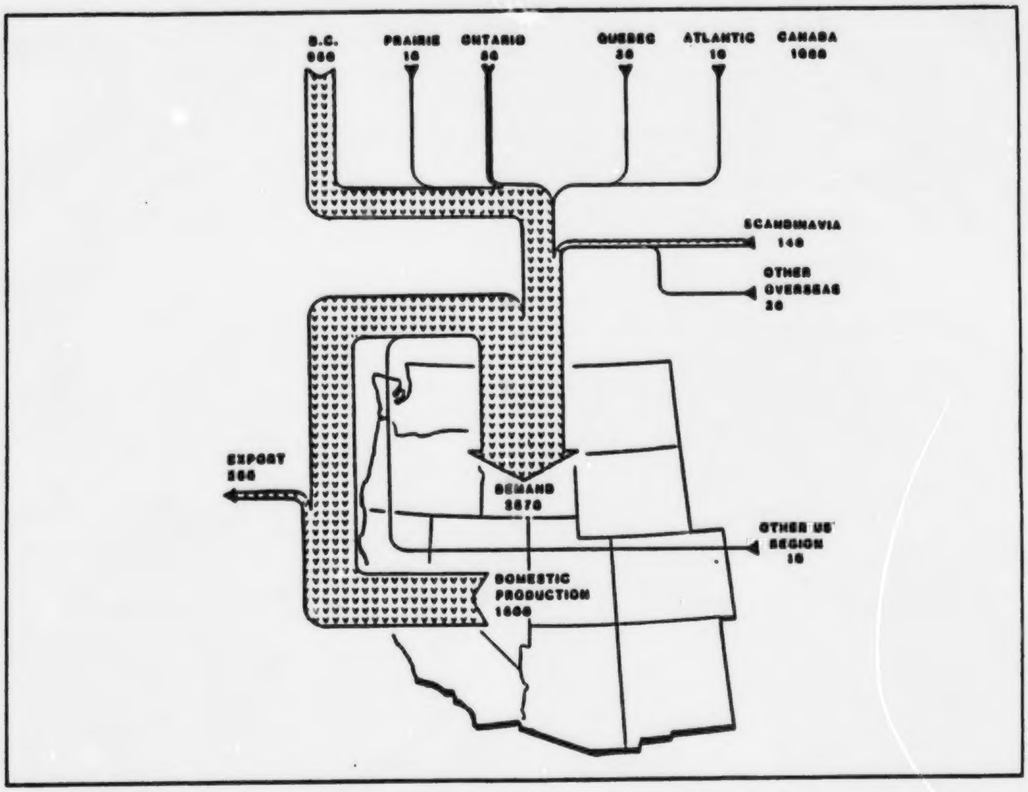

B.C.
850
PRAIRIE
10
ONTARIO
80
QUEBEC
30
ATLANTIC
10
CANADA
1000
SCANDINAVIA
140
OTHER
OVERSEAS
20
EXPORT
200
DEMAND
2570
OTHER US
REGION
10
DOMESTIC
PRODUCTION
1600

Figure F.4.55b U.S. WEST - ESTIMATED NEWSPRINT DEMAND/SUPPLY STRUCTURE

The U.S. West newsprint production capacity was in 1985 1.68 million tons and the majority of that was located in Oregon and Washington (Table T.4.34a). Some of the mills used remarkable amounts of waste paper, namely Garden State Paper, Smurfit Newsprint (Newberg) and Boise Cascade.

Table T.4.34a U.S. West Newsprint Producers

Producer	Capacity 1000 tons/year
Boise Cascade, Steilacoom, WA	170
James River, Port Angeles, WA	20
Wauna, OR	120
Garden State Paper, Pomona, CA	120
Inland Empire, Millwood, WA	60
North Pacific Paper, Longview, WA x)	400
Smurfit Newsprint, Newberg, OR	330
Oregon City, OR	210
Stone Container, Snowflake, AZ	250
TOTAL	**1680**
Capacity Additions	
Misc. Net Improvements	
* Smurfit newsprint 1988	10
* Other	250
Great Lakes Forest Products, Usk, WA	155 (1991)
Assumed New Machine, CA	175 (1993)
TOTAL	**590**
ESTIMATED TOTAL CAPACITY IN YEAR 2000	**2270**

x) Jointly owned by Weyerhaeuser Co. and Jujo Paper, Japan.

The capacity additions on the U.S. West market are shown in Table T.4.34. We have estimated that two new newsprint machines will be built in the region by year 2000 and the continuous improvements of the existing paper machines will additionally increase the capacity by 250,000 tons/year. The total capacity in year 2000 is thus estimated to be 2.3 million tons (Figure F.4.56).

The demand of newsprint is estimated to grow somewhat faster in U.S. West than in the other U.S. regions. This is caused by the development in setting technology providing the publishing/printing houses to move closer to the newspaper reader. As many intercontinental newspaper have been printed in the East and transported to the Westcoast, the computer technolgy now enables printing at the Westcoast and provides for a relatively faster growing newsprint demand.

The estimated imports demand of newsprint is about 1.3 million tons in 1992 and 1.5 million in 2000.

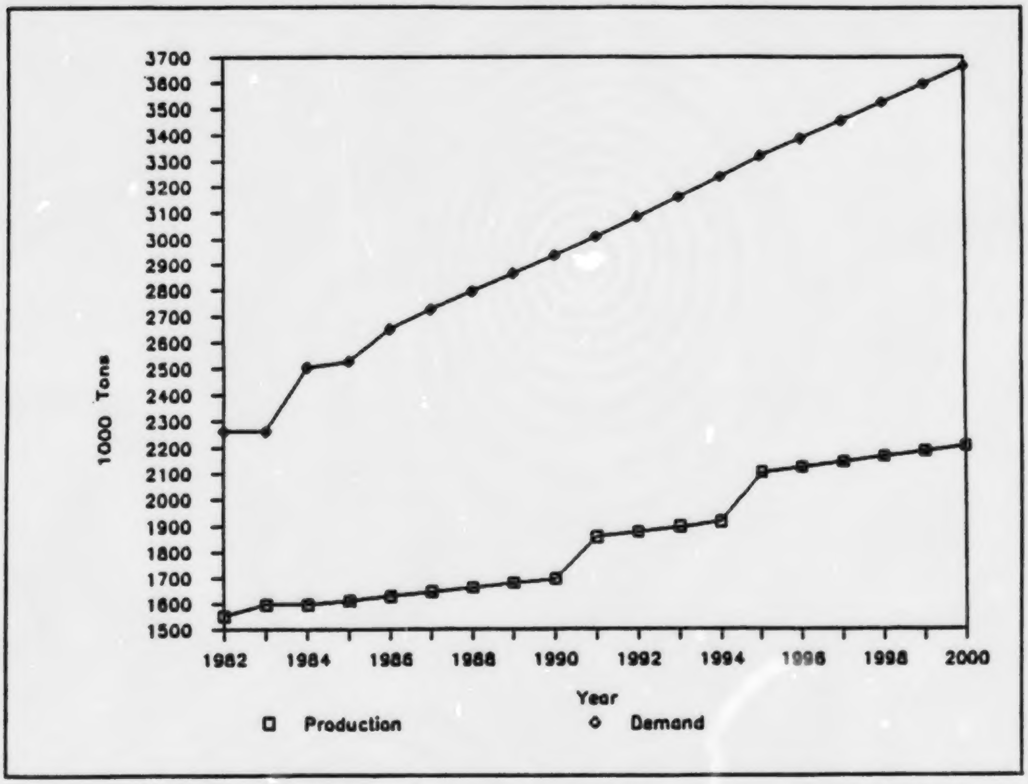


Figure F.4.56. ESTIMATED U.S. WEST NEWSPRINT DEMAND AND DOMESTIC PRODUCTION

The main competitors on the U.S. West newsprint market are summarized in Table T.4.35. The British Columbia producers clearly dominate the markets.

Table T.4.35 Main Competitors in the U.S. West Newsprint Markets

Producer	1000 tons/year
1. British Columbia * British Columbia Forest Products * MacMillan Bloedel * Crown Forest Industries	950
2. Scandinavia * Follum, Norway * Norkse Skog, Norway * Holmens Bruk, Sweden * SCA, Sweden	140
3. Ontario * Abitibi-Price	80

California and especially Los Angeles area is the biggest newsprint consumer in the U.S. West region. The largest daily newspapers are:

Publisher	Estim. 1000 tons/year
1. Los Angeles Times, CA	160
2. San Francisco Cronicle, CA	80
3. Wall Street Journal, CA (West edition)	60
4. San Diego Union, CA	55
5. Oregonion, Portland, OR	50
6. Phoenix Republic, AZ	50
7. Rockey Mountain News, Denver, CO	50
8. Orange County Register, Santa Ana, CA	45
9. Mercury News, San Jose, CA	40
10 Los Angeles Herald-Examiner, CA	40

4.5.5.2 U.S. North Central Newsprint Markets

The Canadian dominance in the U.S. North Central market area is outstanding - about 85 percent of the 2.6 million newsprint demand is supplied by the Canadian producers as illustrated in Figure F.4.57. Of the Canadian share Ontario and Quebec share the major portion, 1.18 and 0.89 million tons respectively in 1985. About 60,000 tons of newsprint was shipped from the Abitibi-Price, Pine Falls, Manitoba mill to the market area. The domestic newsprint is manufactured mainly by F.S.C. Paper Co., Alsip, IL. The overseas imports are of minor importance. About 280,000 tons of newsprint were shipped to the area also from other U.S. regions, mainly from U.S. South.

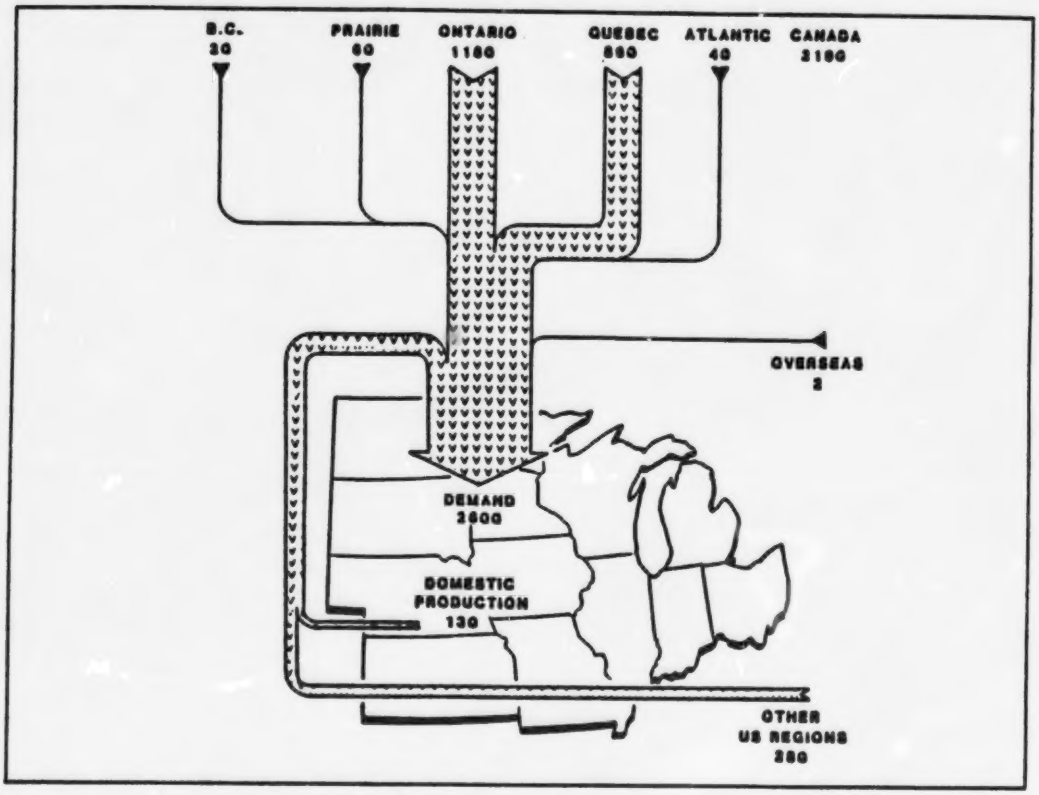

B.C.
30
PRAIRIE
60
ONTARIO
1180
QUEBEC
880
ATLANTIC
40
CANADA
2190
OVERSEAS
2
DEMAND
2600
DOMESTIC
PRODUCTION
130
OTHER
US REGIONS
280

Figure F.5.57 U.S. NORTH CENTRAL: ESTIMATED NEWSPRINT DEMAND/SUPPLY STRUCTURE IN 1985.

There are no announced/planned capacity changes in the North Central area before year 2000. The capacity is estimated to increase only by about 25,000 tons to 145,000 tons during the same period.

Table T.4.36 U.S. North Central Newsprint Producers Capacity in 1986

Producer		1000 tons/year
F.S.C. Paper Co., Alsip, IL		100
Manistique Papers Inc., Manistique, MI		20
TOTAL		**120**
Capacity additions:		
Manistique Papers Inc., Manistique, MI	1987	20
Misc. improvements (--> 2000)		5
Total		25
TOTAL ESTIMATED CAPACITY IN 2000		**145**

The newsprint demand growth in the North Central U.S. has been low compared to the average growth in the U.S. The total demand is estimated to reach 2.95 million tons by the year 2000, that is a 1.4 percent annual growth (Figure F.4.58).

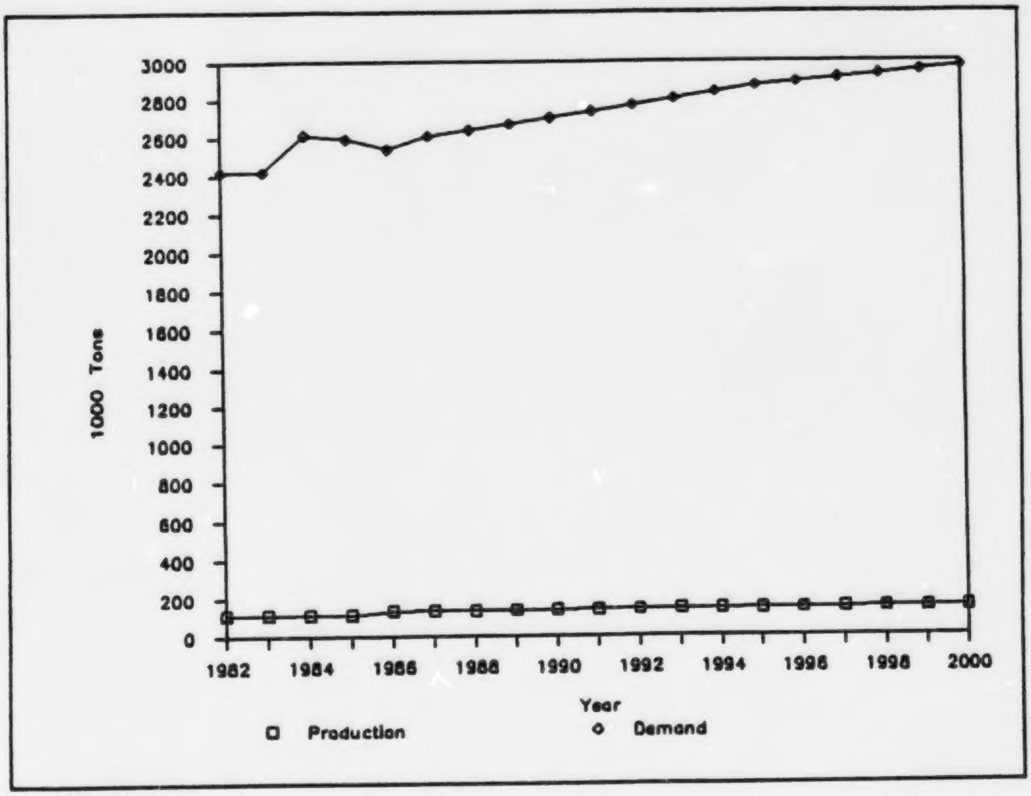


Figure F.4.58. ESTIMATED U.S. NORTH CENTRAL NEWSPRINT DEMAND AND DOMESTIC PRODUCTION

The imports of newsprint is estimated to increase from the current 2.47 million tons to 2.6 million tons in 1992 and to 2.8 million tons by year 2000.

Table T.4.37 summarizes the main competitors in the U.S. North Central newsprint markets.

Table T.4.37 Main Competitors in the U.S. North Central Newsprint Markets

Supplier	Imports 1000 tons/year
1. Ontario	1180
* Abitibi-Price	
* Q.N.S. Paper	
* Ontario Paper	
2. Quebec	890
* Abitibi-Price	
* CIP	
* Consolidated-Bathurst	
3. U.S. South	280
* Bowater Southern, TN	
4. Manitoba	60
* Abitibi-Price	

The newsprint consumption is concentrated into the Chicago and Detroit areas. The largest daily newspapers in the U.S. North Central region are as follows:

Publishers	Estim. Consumption 1000 tons/year
1. Chicago Tribune, IL	110
2. Detroit News, MI	100
3. Detroit Free Press, MI	100
4. Chicago Daily Herald, IL	95
5. Wall Street Journal, IL	80
6. Cleveland Plan Dealer, OH	70
7. Minneapolis Tribune, MN	55
8. St. Louis Post-Dispatch, MO	50
9. Kansas City Times, MO	40
10 Des Moines Register, IO	35

4.5.5.3 U.S. West South Central Newsprint Markets

The importance of the U.S. West South Central region as an importer of newsprint is remarkably less than the importance of the two other Western U.S. regions, the total imports, being modestly 260,000 tons in 1985 which represents about 20 percent of the total newsprint demand in the area. In addition to the U.S. South producers, the Canadian producers dominated the imports as shown in Figure F.4.59.

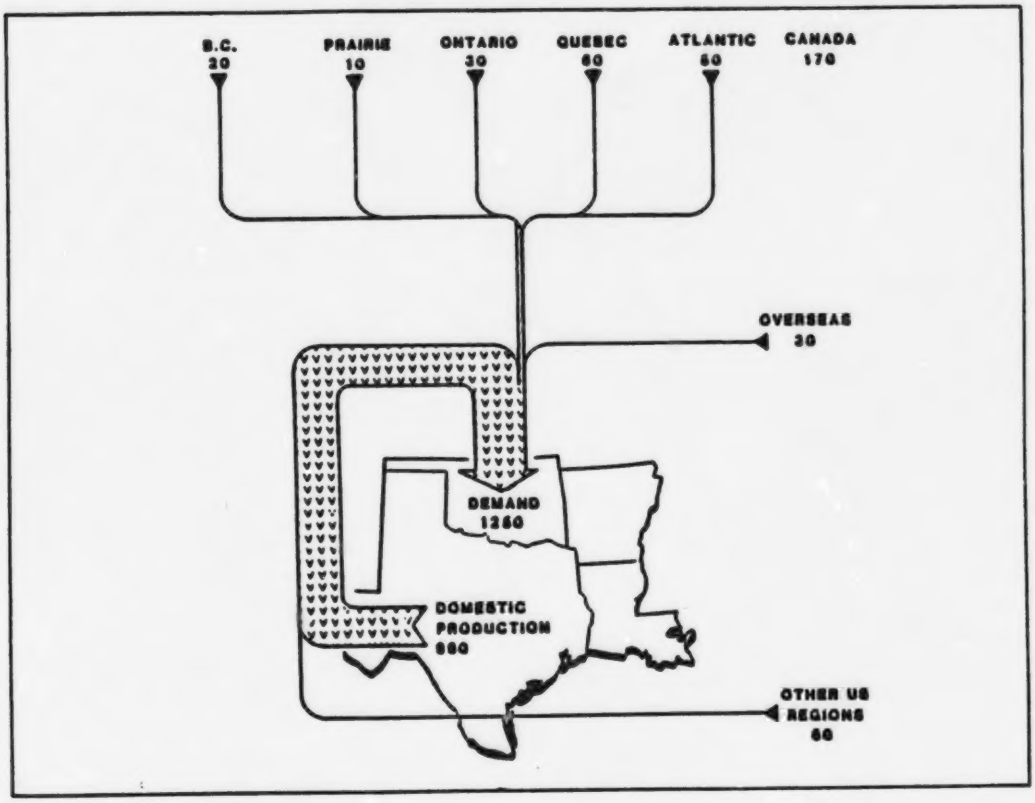

B.C.
20
PRAIRIE
10
ONTARIO
30
QUEBEC
60
ATLANTIC
50
CANADA
170
OVERSEAS
30
DEMAND
1260
DOMESTIC
PRODUCTION
990
OTHER US
REGIONS
60

Figure F.4.59. U.S. WEST SOUTH CENTRAL; ESTIMATED NEWSPRINT DEMAND/ SUPPLY STRUCTURE IN 1985.

The production of newsprint in the area is controlled by Boise Cascade and Champion International. Their total current capacity is about 1.03 million tons per year. The only planned new newsprint machine is the announcement by Kenaf International of building a newsprint mill in Southern Texas. We assume that a new machine will start up in 1995 and that the natural increase in existing capacity will be 170,000 tons by year 2000 (Table T.4.38).

Table T.4.38. U.S. West South Central Newsprint Producers

Suppliers	Capacity 1000 tons/year
Present:	
Boise Cascade, De Ridder, LA	300
Champion International, Houston, TX	420
Champion International, Lufkin, TX	310
Total	1030
Estimated Additions:	
Estimated 1 new newsprint machine in 1995	200
Misc. improvements	170
Total	370
ESTIMATED TOTAL CAPACITY IN 2000	1,400

As well as the U.S. West region, the U.S. West South Central is a growing newsprint publishing/printing area. Based on the growth in the end use industry, we have estimated that the newsprint demand will reach almost 1.7 million tons by the year 2000 as indicated in Figure F.4.60.

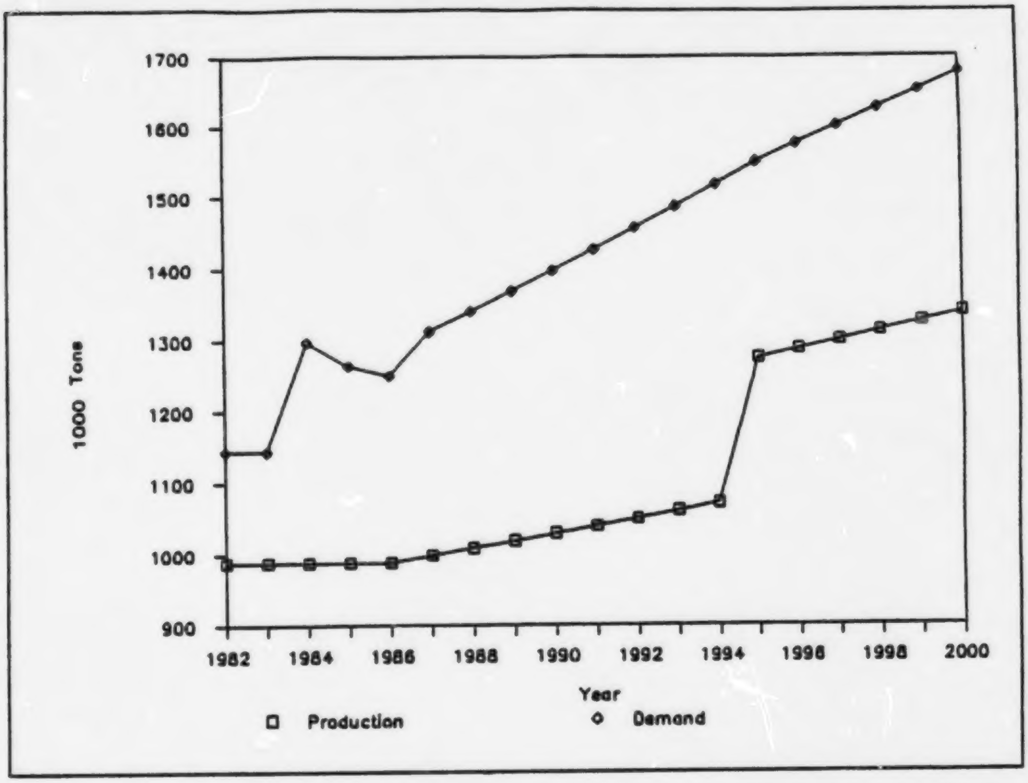


Figure F.4.60. ESTIMATED U.S. WEST SOUTH CENTRAL NEWSPRINT DEMAND AND PRODUCTION

The imports of newsprint will remain at the current level; 0.4 million tons/year in 1991 and also in year 2000.

The main competitors in the U.S. West South Central Markets are shown in Table T.4.39.

Table T4.39 Main Competitors in the U.S. West South Central Newsprint Markets

Supplier	Imports 1000 tons/year
1. Quebec	60
* Abitibi-Price	
2. Atlantic Provinces	
* Stora Forest Products	50
3. U.S. South	
* Bowater Southern, TN	60
4. Overseas	30
* SCA, Sweden	
* Holmens Bruk, Sweden	
* Mondi, South Africa	

The biggest daily newspapers in the U.S. West South Central region are the following:

Publisher	Estim. Consumption 1000 tons/year
1. Houston Cronicle, TX	65
2. Dallas News, TX	60
3. Houston Post, TX	50
4. New Orleans Times, LA	40
5. Oklahoman, OK	35
6. Dallas Times Herald, TX	35
7. Wall Street Journal, TX (Southern Edition)	35
8. San Antonio Express News, TX	25
9. American Statesman, Austin, TX	25
10 World, Tulsa, OK	20
San Antonio Light, TX	20

4.5.5.4 Summary of the Western U.S. Newsprint Markets

The total import demand of newsprint to the Western U.S. market, including shipments from other U.S. regions, was in 1985 about 4 million tons. The strongest growth has taken place in the U.S. West region and the future capacity additions are expected to materialize in that area. Of the U.S. Western regions, North Central has the largest volume growth, an estimated capacity level increase of 340,000 tons/year from the present to year 2000.

4.5.6 Pacific Rim Newsprint Markets

4.5.6.1 Newsprint Markets in Japan

The domestic newsprint production dominates the supply on the Japanese market. Also part of the off-shore shipments from USA and Canada are controlled by Japanese companies: Jujo Paper, Oji Paper and Mitsui. Other major exporters to Japan in 1985 were Canada and the Scandinavian countries, (Figure F.4.61).

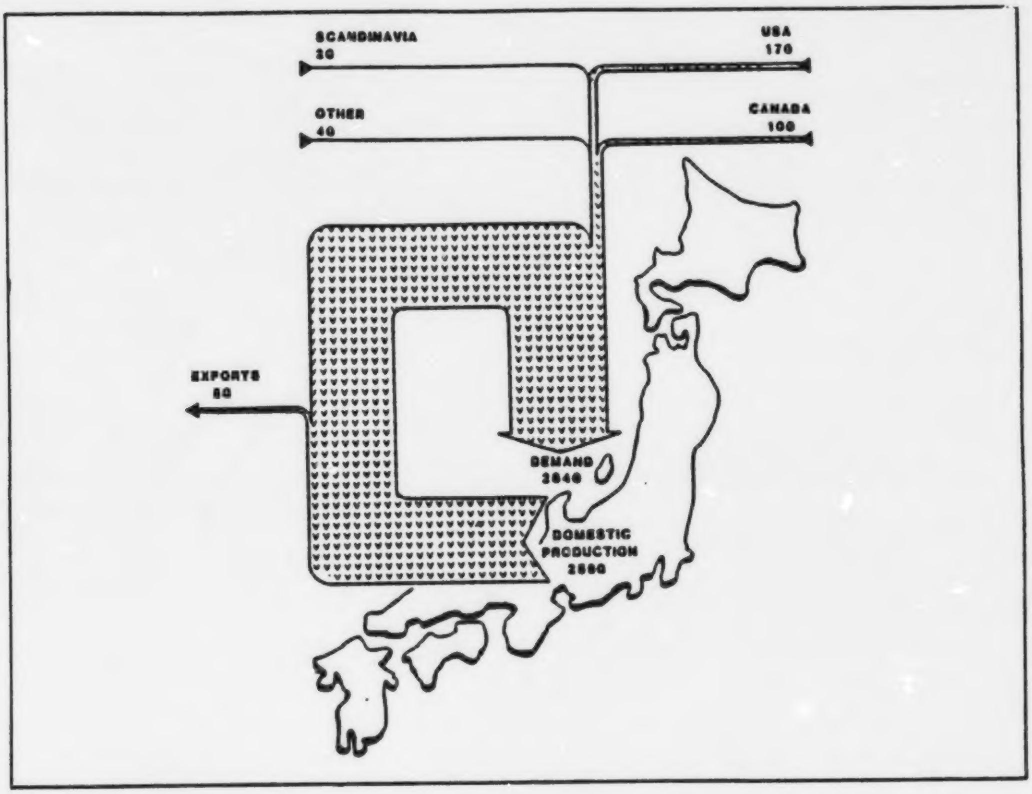

SCANDINAVIA
30
USA
170
OTHER
40
CANADA
100
EXPORTS
80
DEMAND
2840
DOMESTIC
PRODUCTION
2580

Figure F.4.61 NEWSPRINT DEMAND/SUPPLY STRUCTURE IN JAPAN IN 1985

The total Japanese newsprint capacity, including the swing machines, is about 3.3 million tons and is produced in a number of small machines (Appendix A.4.7). Although there are no announced or planned new newsprint machines, the capacity is expected to grow with up to 3 million tons by the end of this century due to the continuous improving in efficiency of the existing machines. The demand of newsprint is forecasted to grow faster, about 2.0 percent/year, than the capacity (Figure F.4.62). Newspaper net imports will grow to about 400,000 tons/year during the next five years and will reach 700,000 tons by the year 2000.

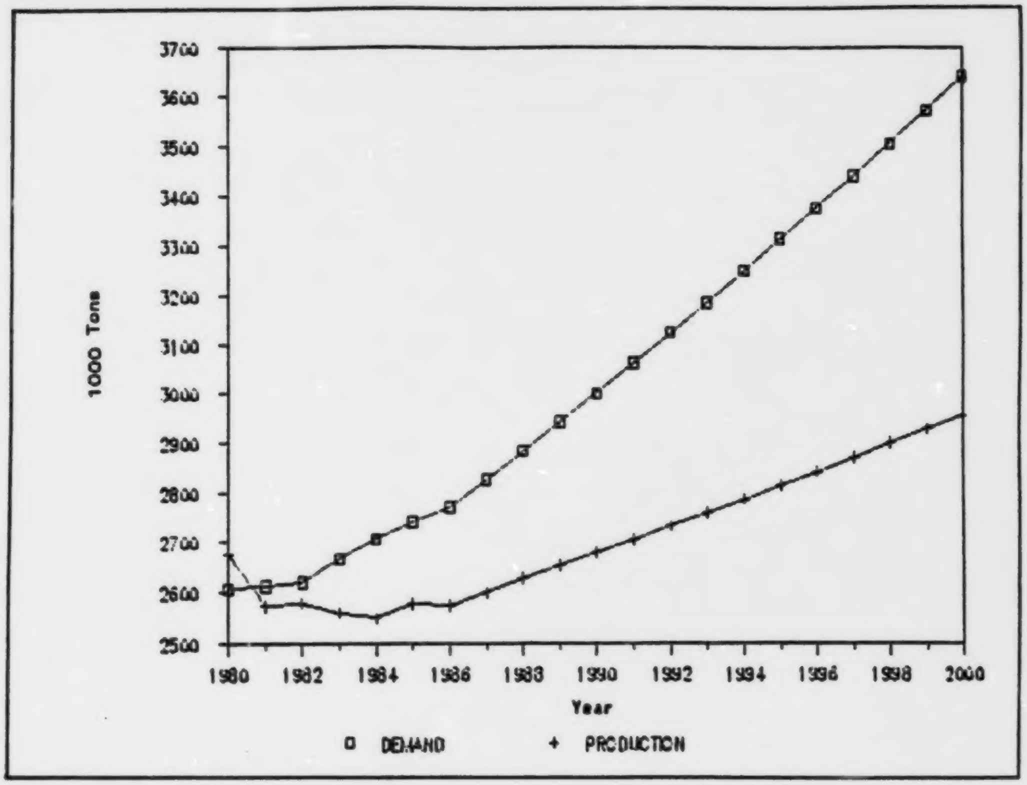


Figure F.4.62. NEWSPRINT DEMAND AND PRODUCTION IN JAPAN

The main exporters of newsprint to the Japanese markets are shown in Table T.4.40. The captive newsprint represented 60 percent of the total imports in 1985, which left about 130,000 tons for open market sales. The total capacity of the North Pacific Paper, Longview mill and the NBIP, Dalhousie mill, in which Japanese companies have equity interests is about 700,000 tons annually.

Table T.4.40. Main Competitors in the Japanese Newsprint Markets

Supplier	Imports 1000 tons/year
1. USA	170
* North Pacific Paper Co. (Jujo Paper Co.)	
2. Canada	100
* MacMillan Bloedel, BC	
* Crown Forest Industries, BC (Fletcher Challenge, New Zealand)	
* NBIP Forest Products, NB (Oji Paper Co. and Mitsui Co.)	
3. Scandinavia	20
* Finnpap, Finland	

Most of the open market sales of newsprint in Japan were handled by the Japanese trading houses, such as: Marubeni and Japan Pulp and Paper Co. Ltd. The two biggest daily Japanese newspapers Yomiuri and Ashahi Shimbu consume together a total of 1.2 million tons of newsprint annually.

4.5.6.2 Newsprint Markets in the Republic of Korea

Republic of Korea is a net exporter of newsprint as illustrated in Figure F.4.62a. The recent start-up of the Chonju Paper Mfg. Co. Ltd. 140,000 ton newsprint machine at Chonju mill will maintain Korea as a net exporter also in the future. After the start-up of the predicted new machine pressure to the export will grow by about 100,000 tons.

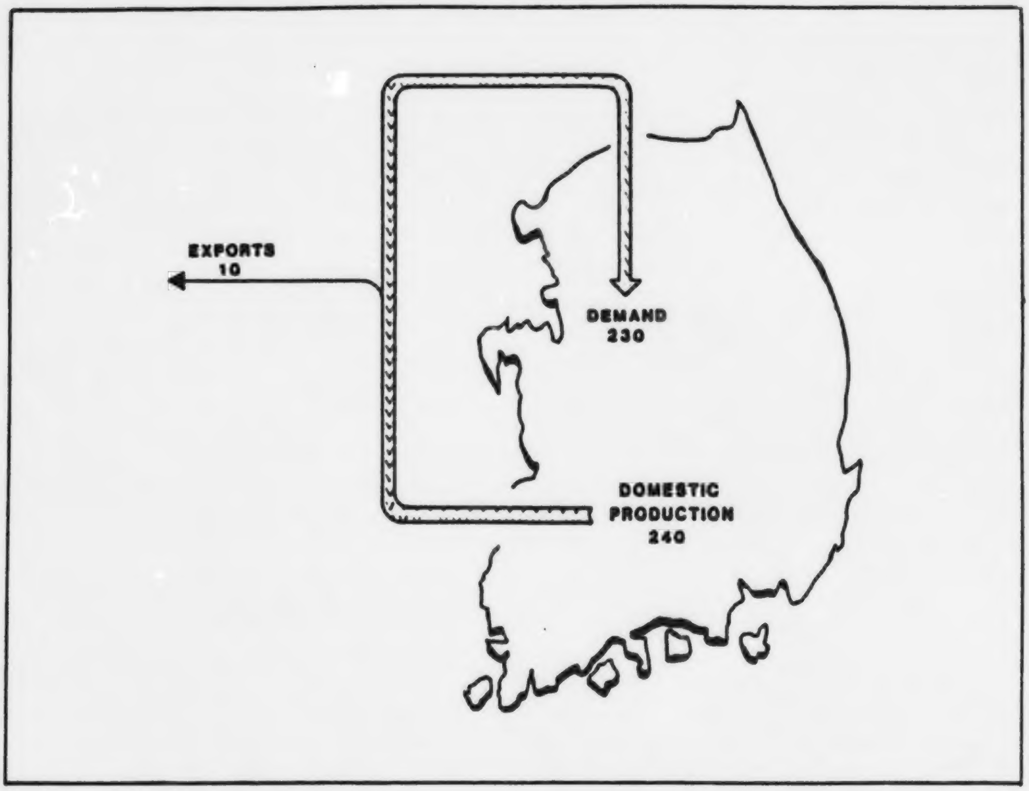

EXPORTS
10
DEMAND
230
DOMESTIC
PRODUCTION
240

Figure F.4.62a. NEWSPRINT DEMAND/SUPPLY STRUCTURE IN THE REPUBLIC OF KOREA IN 1985.

The existing newsprint capacity is listed in Table T.4.41.

Table T.4.41 Newsprint Capacity in the Republic of Korea

Producer	Capacity 1000 tons/year
Chonju Paper Mfg. Co. Ltd., Chonju	160
Daihan Paper Mfg. Co. Ltd., Seoul	18
Sampoong Paper Mfg. Co. Ltd, Seoul	22
SeDae Paper Mfg. Co., Ltd. Gumsum	146
TOTAL	346

The consumption of newsprint is estimated to grow up to 400,000 tons by the year 2000.

4.5.6.3 Newsprint Markets in People's Republic of China

Many small mills using non-wood fiber, producing several newsprint grades and each surving its immediate market area is currently the backbone of China's newsprint industry. The biggest newsprint producers are listed in Table T.4.42.

Table T.4.42. Newsprint Capacity in People's Republic of China

Supplier	Capacity 1000 tons/year
1. Jiamusi Paper Mill	50
2. Jianxi Paper Mill	40
3. Jilin Paper Mill	70
4. Guangzhou Paper Mill	100
5. Guilin Paper Mill	39
6. Liushou Paper Mill	40
7. Ming Foon Paper Mill	2
8. Nanning Paper Mill	39
9. Nauping Paper Mill	64
10. Qigihar Paper Mill	80
11. Shixian Paper Mill	60
12. Yibin Paper Mill	50
13. Yueyang Paper Mill	40
TOTAL NEWSPRINT CAPACITY	647 (Swing Capacity 70)

The capacity utilization degree in the newsprint industry have been rather low and for example the domestic production marketed only 430,000 tons in 1985 (about 90 percent utilization). Of the total demand, 600,000 tons, about 270,000 tons were supplied by Canadian and Scandinavian companies (Figure F.4.63).

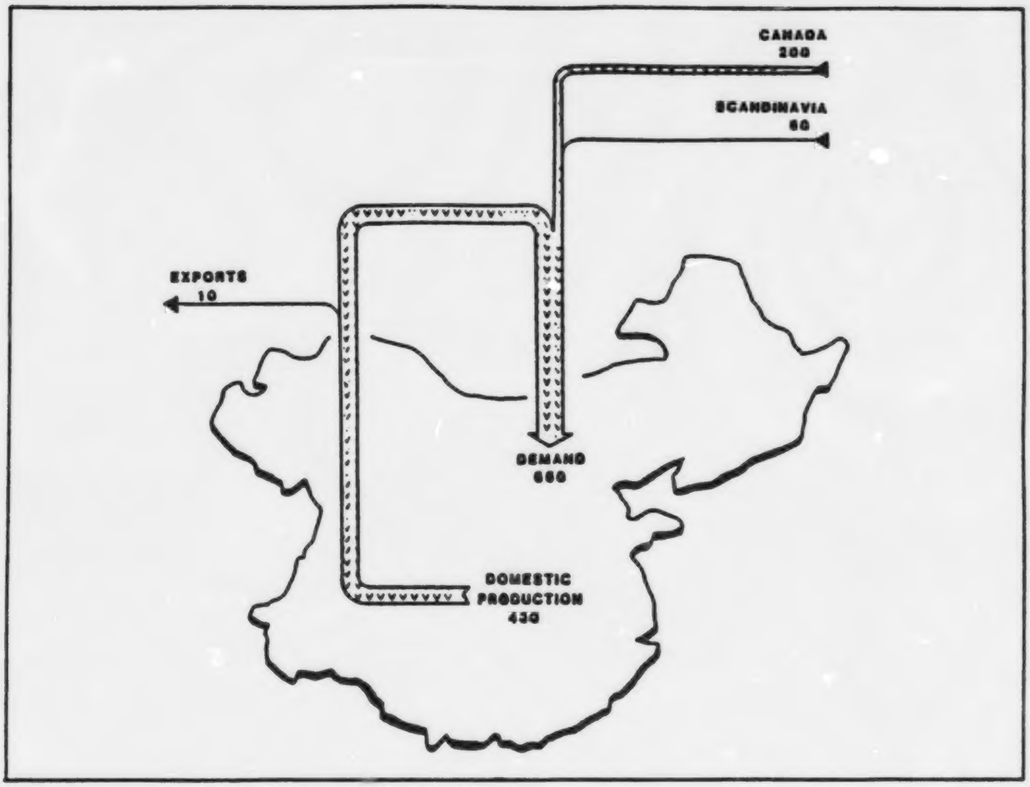


Figure F.4.63. NEWSPRINT DEMAND/SUPPLY STRUCTURE IN PEOPLE'S REPUBLIC OF CHINA IN 1985

China is planning to double their paper and board consumption by year 2000. The total paper and board output will be about 20 million tons/year by then. Also the newsprint demand is estimated to double during the same period and should reach about 1.6 million tons by the end of the century.

Machine rebuild programs, purchases of second hand machines, participation in capital ventures outside China and the increasing interest taken by the international forest products suppliers in the Chinese market are all recent signs of an industry keen to expand.

In the newsprint industry the following capacity changes are already announced:

1. Guangzhou Paper Mill
    - * PM (3) rebuilt (86-89)
2. Jilin Paper Mill
    - * New secondhand machine (1987)

3. Liuzhou Paper Mill
   * PM rebuilt (1986)
4. Yueyang Paper Mill
   * PM rebuilt (1987)

In spite of the several expansion programs, the imports of newsprint is estimated to increase moderately to 400,000 tons in 1992 and to 800,000 tons in 2000 (Figure F.4.64).

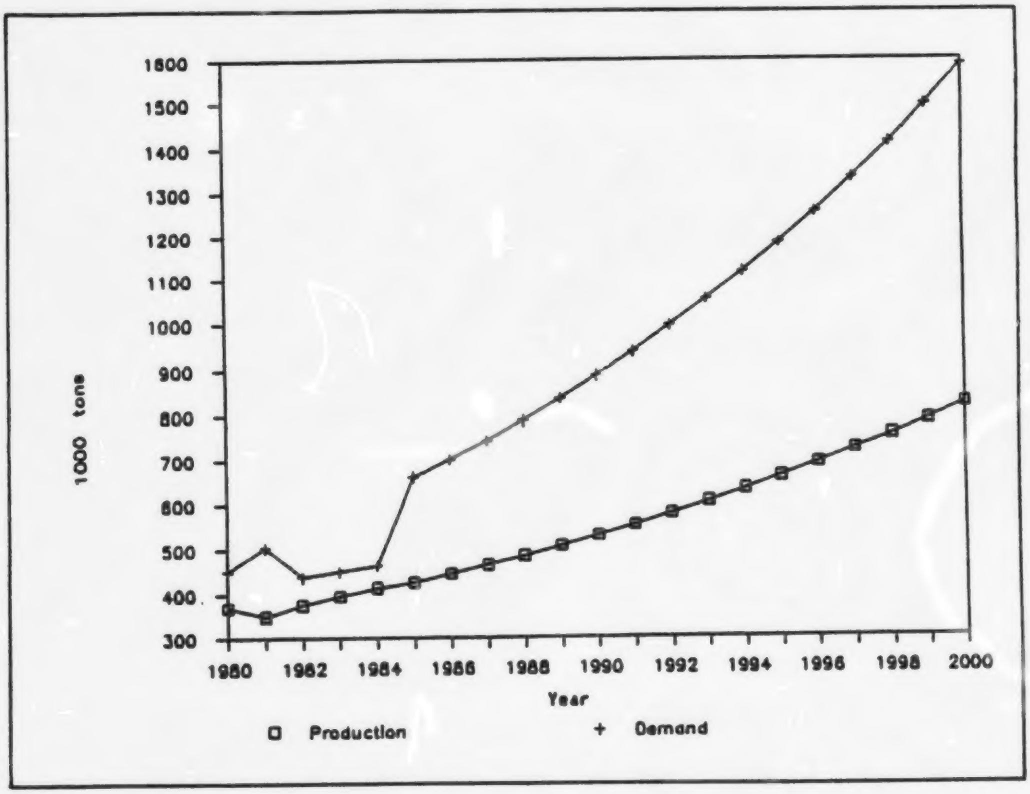


Figure F.4.64. NEWSPRINT DEMAND AND PRODUCTION IN PEOPLE'S REPUBLIC OF CHINA

The main competitors in the Chinese newsprint market are Canada (B.C. producers), Finland and Sweden.

4.5.6.4 Summary of the Pacific Rim Newsprint Market

In Table T.4.43 the newspaper imports demand is summarized for the Pacific Rim countries. The total net imports to the Pacific Rim, not included in the market survey, was about 590,000 tons in 1985. This was supplied mainly by Canada (200,000 tons), Norway (75,000 tons,) Finland (65,000 tons), Sweden (65,000 tons) and USA (50,000 tons).

Table T.4.43 Newsprint Import Demand in Some Selected Pacific Rim Countries

County	1000 tons/year 1985	1992	2000
Japan	250	400	700
Republic of Korea	-10	-40	-
People's Republic of Korea	250	400	800
Total	490	760	1500
Australia	180		
New Zealand	-170		
Taiwan	90		
Hong Kong	120	Not	Not
Philippines	-	Calc.	Calc.
Malaysia	100		
Thailand	110		
Indonesia	60		
Singapore	100		
TOTAL	590		

4.5.7 Summary of Newsprint Markets

The market supply/demand outlook is presented in Table T.4.43.A for the selected market areas. The Western Canadian producers clearly dominate the exports in these selected market regions while the U.S. West and U.S. North Central regions are the main importers of newsprint. Japan and the People's Republic of China are growing net importers of newsprint in the Pacific Rim area.

Table T.4.43.A. Newsprint Market Outlook in Selected Market Areas

	Demand			Prod. (1000 tons/year)			Import			Export		
Market Area	'85	'92	'00	'85	'92	'00	'85	'92	'00	'85	'92	'00
Domestic	330	450	600	1680	1980	2300	0	0	0	1350	1530	1700
U.S. West	2570	3100	3650	1600	1850	2200	1250	1530	1730	280	280	280
U.S. North Central	2600	2750	2950	130	140	145	2470	2610	2805	0	0	0
U.S. West South Centr.	1250	1450	1700	990	1040	1300	260	410	400	0	0	0
Japan	2840	3050	2660	2590	2650	2960	330	400	700	80	0	0
Rep. of Korea	230	310	410	240	350	410	0	0	0	10	40	0
People's Rep. of China	660	1000	1600	430	600	830	240	410	780	10	10	10
TOTAL	10480	12110	14570	7660	8610	10145	4550	5360	6415	1730	1860	1990

4.6 Distribution Channels

Figure F.4.65 shows common shipment sizes for the paper grade of interest. For newsprint and SC-rotogravure, SC-offset and LWC-rotogravure the proportion of large shipments dominate while for LWC-offset grade the proportion of small orders is rather high.

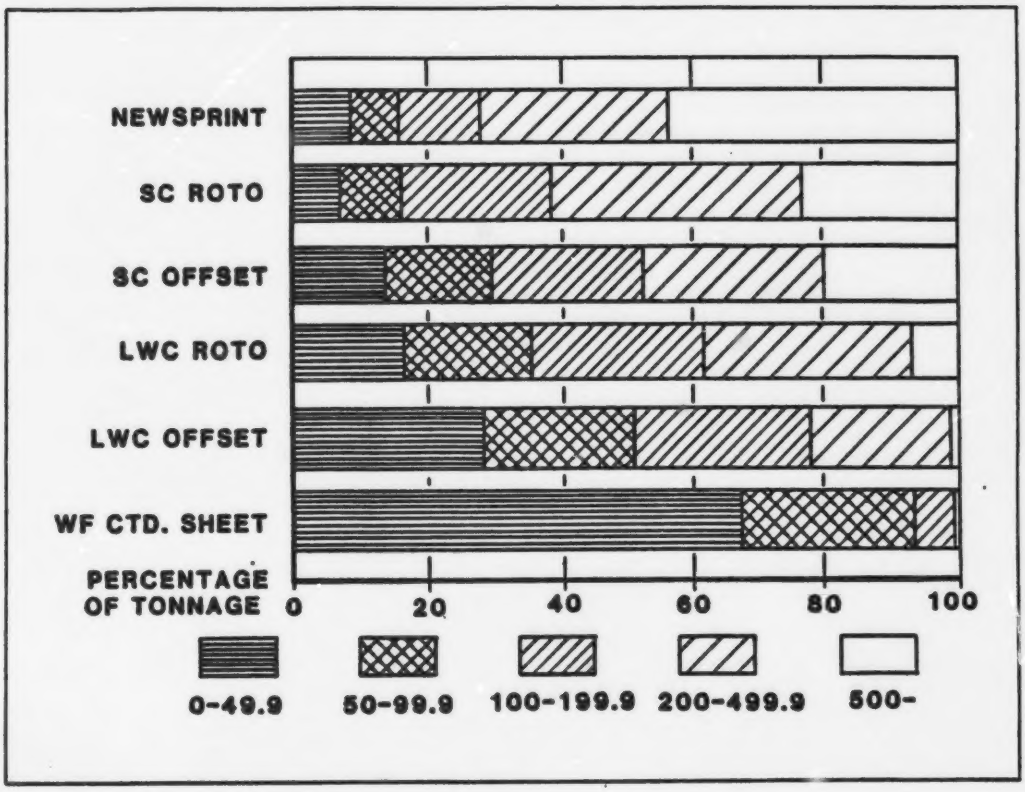


Figure F.4.65. SHIPMENTS SIZES FOR GROUNDWOOD PAPERS

For reference also the average shipment size of coated freesheet paper is illustrated.

Major North American, newsprint, SC- and LWC-producers normally have distribution channels of their own. In the solid bleached board industry about 60% of the production was shipped directly to the integrated converting plants, the rest being distributed by the company's owned agencies and independent brokers.

In the following section the most vulnerable segment distribution of printing and writing papers of off-shore imports is analyzed in more detail.

Newsprint

Of the 330,000 tons of off-shore imported newsprint sold in the U.S, about 90 percent were sold through foreign or independent organizations. These distributions do not normally have any storages in the U.S., although Finnpap has a 30 day warehouse in the Philadelphia region.

The Swedish Stora Gruppen seems to have the greatest number of representatives in the U.S.; Zellerbach Paper Co., Blake Moffit & Town, General National-Gottesman, and Monarch Paper.

In addition to the direct sales channels, SCA from Sweden has its representative in California (Behrens Pulp and paper Co.).

The South-African tonnage is sold primarily by General National-Gottesman, Price and Pierce and Richard Lewis Paper.

Finnish newsprint selling is handled by Finnpap and Madden Corp., while the Norwegian imports is sold by Nor-News, an organization owned by Norwegian newsprint producers.

SC-Paper

Almost all of the 350,000 tons of SC-paper imported (off-shore) to the U.S. were distributed by foreign or independent sales organizations. Some of the Norwegian and Swedish tonnage was directly sold to Sears and R.R. Donnelly. In the large order business there is no business for merchants. On the other hand it is normal that the sales organizations allow brokers to sell part of the tonnage to their customers.

In addition to Finnpap/Madden Corp. sales part of the Finnish tonnage is sold by Myllykoski and probably by Rauma-Repola after its resignation from Finnpap.

Coated Paper

In 1985, about 380,000 tons of coated paper was imported to the U.S. from off-shore sources. About 50 percent of this was sold by foreign or independent sales organizations. In many cases the remaining 50 percent was imported by the converters in full size and repacked under their own private labels.

The largest importer in 1985 was Madden Corp. The second largest tonnage of off-shore imports from Feldmühle AG was distributed by Services Merchandise, Meredith-Burda and General National-Gottesman.

In Japan and Republic of Korea the local trading houses are the most important importers of pulp and paper. The following list summarizes the major importers to Japan:

- Japan Pulp & Paper Co. Ltd.
- Kanematsu Gosho Ltd.
- Koike Sangyo K.K.
- Nippon Kores K.K.
- Nippon Paper Trading Co. Ltd.
- Okamoto Co. Ltd.
- Sanko Co. Ltd.
- Toyo Pulp Co. Ltd.
- Spicers Japan Ltd.
- Wiggins Teape Ltd.

In the People's Republic of China paper imports are controlled by the government; China National Light Industrial Products Import and Export Corp. and Paper Industry Bureau of the Ministry of Light Industry. To be able to successfully do business in China it is necessary to use agents located in Hong Kong or Singapore or similar.

5. EVALUATION OF ALBERTA'S COMPETITIVENESS

5.1 General

This section evaluates the competitiveness of Alberta against other major paper producers competing in the same market areas as Alberta. The objective of the evaluation is to provide enough information to select two value added paper products, of the four included in the market survey, for further financial evaluation.

Only new greenfield installations were considered and all were compared on an equal hypothetical basis. The capital charge portion thus is higher than for existing old mills. The operating costs, however, reflect quite well the situation in modern existing mills of this type.

5.2 Identification of Potential Competitors

A summary of the competitors in the surveyed market areas is presented in Table T.5.1.

Table T.5.1. Potential Competitors in the Surveyed Market Areas

Competitor/ Market	B.C.	Eastern Canada[1]	U.S. North-east	US Pacific Northwest	US South	Scan. & Germany
Domestic	News	News, FBB, SC, LWC			FBB	
U.S. West	News	News, SC, LWC	SC	News, FBB	FBB, LWC	News, SC, LWC
US N/C		News, SC	SC		News, FBB LWC	News, SC, LWC
US W/S/C		News	SC		News, FBB LWC	News, SC LWC
Japan	News				FBB	News, FBB SC, LWC
China	News					News, FBB SC, LWC

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[1] Quebec and Ontario

Competitors in the surveyed market areas are thus:

* British Columbia
* Quebec and Ontario (Eastern Canada)
* U.S. Northeast (SC paper only)
* U.S. Pacific Northwest
* U.S. South
* Scandinavia (Finland for all grades/Sweden for newsprint only)
* Germany

Based on the existing situation in the market areas, the following geographical mill locations have been included as Alberta's potential competitors:

1. For all paper grades
   British Columbia (interior B.C.)
   Eastern Canada (Ontario and Quebec)
   U.S. South
   U.S. Pacific Northwest (U.S. PNW)
   Finland

2. For SC paper additionally
   U.S. Northeast

3. For newsprint additionally
   Sweden

5.3 Comparison of Unit Prices as Production Cost Components

5.3.1 Wood Raw Material Cost

Two reasons for locating a pulp and paper operation in Alberta are the vast forest resources available and the reasonable Crown timber dues (stumpage fees). Currently these fees range from CAD 0.18 to CAD 1.22 per m^3 for softwood suitable for pulping. Hardwood fees are somewhat lower than this, about CAD 0.25 to CAD 0.50 per m^3.

Delivered wood costs are heavily dependent on the haul distance to the mill and the log size. Recent estimates show that softwood roundwood can be delivered at costs ranging from CAD 22 to CAD 27 per m^3. Table T.5.2 shows a typical breakdown of these costs plus chipping costs at the mill site.

Table T.5.2. Alberta Softwood Chip Costs(1)

Cost Item	CAD/m^3	CAD/BDT
Felling/skidding/decking	10.54-12.45	28.88-34.11
Loading	1.04-1.22	2.85-3.34
Hauling (2)	4.05-4.75	11.10-13.01
Road Construction	1.70-2.01	4.66-5.51
Forest Management	1.84-2.19	5.04-6.00
Reforestation	2.65-3.16	7.26-8.66
Stumpage Fees	0-18-1.22	0.49-3.34
Subtotal	22.32-26.88	61.16-73.64
Chipping at mill site	1.83-2.19	5.01-6.00
TOTAL	24.15-29.07	66.17-79.64

(1) In this study, softwood is assumed to have a density of 370 to 400 kg per green m^3.

(2) Average haul of 85 km

The data in T.5.2 are based on a 85 km average haul distance and on experience in western Alberta where there is a well developed logging road system. In the three northeastern forest areas considered in this study, however, the average haul distance will be on the order of 150 km and the cost of constructing roads where none exist will be significantly higher. For the purposes of this study, the following costs for hauling and infrastructure development are assumed:

Hauling	CAD 7.15-CAD 8.38/m^3
Road Construction	CAD 3.40-CAD 4.02/m^3

This raises the total cost of softwood delivered to the study site (Fort McMurray) including chipping to CAD 28.95-CAD 34.71/m^3 (CAD 79.32-95.10/BDT).

Softwood chips from sawmills are also available in Northeastern Alberta. According to the Alberta Forest Service, the average delivered price for softwood chips in the province averages about CAD 60 per BDU (CAD 55.13 per BDT). Transportation is the biggest factor determining this cost as shown here:

Chip Cost f.o.b. Sawmill	CAD 25/BDU
Transportation Cost	CAD 35/BDU
Chip Cost f.o.b. Pulpmill	CAD 60/BDU

This cost of residual chips seems low in comparison with the cost of chips from roundwood. However, in light of the fact that a typical Alberta Forest Management Agreement obligates a company to utilize chips (otherwise wasted) at the weighted average price received for wood chips of equal quality at producing sawmills in Alberta, the CAD 55/BDT is assumed valid for the purposes of this study.

Hardwood costs in Alberta are also very sensitive to the haul distance to the mill. A recent study showed that delivered hardwood log costs varied from CAD 19.30 to CAD 35/m^3 (CAD 53.61 to CAD 99.08 per BDT) for haul distances of 36 to 216 km, respectively. Other studies show the delivered cost of hardwood to range from CAD 71.39 to CAD 88.19 per BDT. Hardwood is not utilized in any of the four paper and paperboard grades studied here.

A comparison of softwood chip costs in the competing areas is summarized in Table T.5.3.

Table T.5.2A. Prices of Wood Raw Materials

	Softwood CAD/BDT Chips
Northeast Alberta	90
B.C.	64
Eastern Canada	95
U.S. South	71
U.S. North	80
U.S. Pacific Northwest	65
Finland	170
Sweden	150

Note: The price figures are based on raw material available (chips, roundwood) in the specific areas.

Northeastern Alberta is in a favorable position only in comparison with northern Europe and possibly eastern Canada. From a papermaking standpoint, however, the Alberta wood species consisting of lodgepole pine, white spruce, black spruce and balsam fir, are generally superior to U.S. Southern pines and even Pacific Northwest hemlock and douglas fir. Pulping yields for Alberta species are also marginally higher than for southern pines and Pacific Northwest species.

5.3.2 Energy Cost

Table T.5.3 presents the energy prices for the different competing regions. In the areas where no "low cost energy" typically is available (e.g. U.S. Northeast, Scandinavia) the fuel price has been taken at the actual market price of No. 6 fuel oil (approximately USD18 /bbl).

Table T.5.3. Energy Prices in the Competing Areas

	Power CAD/MWh	Fuel CAD/GJ	Heat in Steam CAD/GJ
Alberta	24	1.8	2.25
B.C.	24	3.2	4.00
Eastern Canada	23	4.2	5.25
U.S. South	55	2.1	2.62
U.S. Northeast	55	3.0	3.75
U.S. Pacific Northwest	30	1.6	2.00
Finland	50	3.0	3.75
Sweden	40	3.0	3.75

5.3.3 Chemicals Cost

The cost of chemicals used in the comparison is summarized in Table T.5.4.

Table T.5.4. Cost of Chemicals, CAD/t chemical

	Alberta	B.C.	Eastern Canada	U.S. South	U.S. PNW	U.S. North	Finland	Sweden
Mechanical pulping chemicals								
Sodiumhydroxide, NaOH	230	220	300	200	220	220	260	
Sodiumsulphite, Na_2SO_3	750	775	970	940	760	230	930	
Hydrogen peroxide, H_2O_2	1,600	1,600	1,600	1,700	1,700	1,700	1,270	
Sodiumsilicate	320	320	320	320	320	320	320	
Papermaking chemicals								
Retention aid	1,230	1,230	1,150	800	800	800	650	800
Alum	230	230	210	210	230	210	290	300
Defoamers	3,000	3,000	3,000	2,000	2,000	2,000	1,500	2,000
Slimicide etc. (estimate)	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Calcium carbonate, $CaCO_3$								
filler grade	228	184	162	175	170	-	137	-
coating grade, No. 1	275	234	220	225	221	-	165	-
Kaolin								
Filler grade	250	198	183	128	198	160	112	-
Coating grade, No. 1	294	242	227	144	242	-	212	-
Coating grade, No. 2	266	214	199	128	214	-	212	-
Delaminated clay	303	251	236	181	251	-	212	-
Rosin size	1,230	1,230	1,150	800	800	800	650	800
Starches								
Pearl starch	545	555	475	445	500	-	500	-
Catonic starch	1,047	1,057	977	1,335	1,395	-	675	-
Synthetic resin PVAC	2,258	2,270	2,130	1,390	1,390	-	2,060	-
S-B latex	2,450	2,400	2,000	1,700	1,800	-	2,000	-
CMC	5,200	5,200	5,140	4,160	4,220	-	3,000	-
Dyes (estimate)	10,000	10,000	10,000	10,000	10,000	-	10,000	-

With regard to the chemicals used in mechanical pulping processes, Alberta is comparable to other locations.

The main paper making chemicals (clays, calcium carbonates, starches and resins), however, must be imported from the U.S. or Eastern Canada. High freight rates increase the cost of these chemicals compared to the competing areas.

5.3.4 Purchased Pulps

The prices of market pulps were taken as those prevailing for the third quarter of 1986. These prices are as shown in Table T.5.5. A separate column shows the actual market pulp prices in Canadian dollars.

Table T.5.5. Price of Market Pulp, CAD/ADT

	1986/III	1987/II
Bleached kraft, softwood	640	629
Semibleached kraft, softwood	625	614
Bleached CTMP, softwood	513	504
Bleached CTMP, hardwood	493	485

The prices are assumed to be similar in all competing areas in North America.

5.3.5 Labour Cost

The comparisons are based on the labour costs and working hours summarized in Table T.5.6 below. A four shift work schedule is assumed for the North American areas, while the Scandinavian labour costs presume a five shift work schedule.

Table T.5.6. Labour Costs

	Operating Labour CAD/h	Maintenance Labour CAD/h	Admin. and other, Average CAD/h	Average Working Time h/year
Alberta	21	23	29	2000
B.C.	22	24	31	2000
Eastern Canada	22	24	30	2000
U.S. South	23	25	33	2000
U.S. PNW	31	33	39	2000
U.S. North	26	28	33	2000
Finland	21	21	26	1800
Sweden	23	23	30	1800

5.4 Transportation Costs

Alberta is at a disadvantage when it comes to moving paper and board products to customers. The reasons for this key mainly on two factors:

- Alberta's relative isolation from major markets compared to its competitors.
- The current rail rate structure in Canada.

Notwithstanding the generally higher rail rates in Canada, truck rates are about CAD 0.808 per km; U.S. rates are USD 0.808 per km. This gives Canadian trucking a 25 percent cost advantage over U.S. trucking. On a per metric ton basis, paper and paperboard can be shipped for CAD 0.037 per ton-km while in the U.S. it costs CAD 0.049 per ton-km.

Table T.5.7. compares the costs for shipping the four grades considered in this study from competing mills. To develop this table a unique market distribution was selected for each grade and millsite. For example, a mill producing SC in Quebec would ship no paper to Los Angeles or Tokyo, while the same mill in Alberta would ship 50% and 15% to these two areas, respectively. In all cases, the market distribution assumed for each mill and grade was based on the results of the market survey in Section 4 of this report.

Table T.5.7. Transportation Costs - Alberta Mill Versus Competing Mills

Mill Location	Paper/Paperboard Grades News	 SC CAD/ton	 LWC	 FBB
Alberta	148	144	145	156
NE Canada	53	39	109	36
East U.S.	*	*	*	64
South U.S.	*	*	95	41
SE U.S.	53	*	*	*
NE U.S.	*	141	*	*
NW U.S.	76	71	77	77
Interior B.C.	128	103	132	*
Finland	133	124	119	104

* No competing mill assumed for this grade or location.

In all cases transportation costs are higher from a mill in Alberta than from competing mills. As mentioned above, one reason for this is Alberta's location relative to potential markets. Another reason not evident from Table T.5.7 are the currently low ocean freight rates for competitors.

5.5 Taxes

Canada, like other western industrialized countries, is reforming its tax code to broaden the base, to reduce tax preferences, and to enhance overall revenue. Table T.5.8 shows the tax situation in Canada before and after tax reform. Federal tax reform legislation will probably be introduced in June 1987 and implemented in 1988.

Table T.5.8. Status of Corporate Tax Situation in Canada and Alberta

		Present	After Tax Reform
Federal			
Income tax (1)	(%)	28	26
Sur Tax	(%)	3	0
Sales Tax (Construction items)	(%)	8	0
Sales Tax (Other goods) (2)	(%)	12	0
Business Transfer Tax (3)	(%)	0	6-8
Alberta			
Income Tax (4)	(%)	9	9
Sales Tax	(%)	0	0
Property Tax (5)	(%)	3/4	3/4

(1) Present rates are being reduced from 28 percent% in 1987 to 27 percent in 1988, to 26 percent in 1989 and beyond.
(2) Also assessed on all imported manufactured goods. Imported machinery also subject to Canadian tariffs depending on type of machinery.
(3) A value added tax (VAT) applied across-the-board to all goods and services.
(4) Effective April 1, 1987
(5) Estimate only. Applied to capital cost of project including land.

Along with tax rates, depreciation schedules (capital cost allowances) and the investment tax credit (ITC) will be modified as shown in Table T.5.9.

Table T.5.9 Changes to Capital Cost Allowances and Investment Tax Credits in Canada

Allowance		Present	After Reform
Capital Cost Allowance			
Manufacturing Equip.	(%)	(1)	20 (2)
Buildings	(%)	5 (2)	5 (2)
Other Property	(%)	20 (2)	20 (2)
Investment Tax Credit			
Normal (3)	(%)	5	0
NW Alberta (4)	(%)	40	0

(1) Taken in three consecutive years at rates of 25 percent, 50 percent and 25 percent, respectively, calculated on original investment.
(2) Calculated on declining balance
(3) To be reduced to 3 percent in 1988 and 0% in 1989 and thereafter; a 20 percent credit for R&D expedítures will remain.
(4) NW Alberta (north of Edson & Whitecourt and not including Grande Prairie) is a Special Investment Tax Credit area. Tax reform may eliminate this credit.

Carry forward of operating tax losses will remain unchanged at seven years.

5.6 Manufacturing Cost Comparison of SC Paper Production

5.6.1 Basic Data

The SC paper manufacturing is based on an integrated production of bleached softwood thermomechanical pulp and purchased bleached kraft softwood pulp. An alternative concept for Alberta was included, based on integrated TMP production and purchased bleached CTMP and bleached kraft pulp. Table T.5.10 summarizes the furnish used in the comparisons.

Table T.5.10. Furnish for SC Paper

		Alta Alt. 1	Alta Alt. 2	B.C.	Canada East	U.S. South	U.S. PNW	U.S. North	Finland
Basis wt	g/m^2	60	60	60	60	60	60	60	60
Furnish									
CTMP, swd	%	23	0	0	0	0	0	0	0
TMP, swd	%	40	58	58	58	55	58	56	58
BK, swd	%	12	17	17	17	20	17	17	17
Filler	%	25	25	25	25	25	25	25	25
TOTAL	%	100	100	100	100	100	100	100	100

Table T.5.11 summarizes the production and the fiber and wood demands of the SC paper mill.

Table T.5.11. Production, Fiber and Wood Demands for the SC Paper Mill

		Alta Alt 1	Alta Alt 2	U.S. South	Other Areas
Production	tp/yr	175,000	175,000	175,000	175,000
Fiber demand					
TMP (integrated)	ADt/yr	73,700	107,000	101,500	107,000
Purchased CTMP	ADt/yr	42,400	--		
Purchased BK	ADt/yr	22,000	31,300	37,000	31,300
Clay demand	BDT/yr	42,800	42,800	42,800	42,800
Wood demand	BDT/yr	75,000	109,000	105,500	109,000
Fiber losses	%	2	2	2	2
Clay losses	%	5	5	5	5

The main data for the integrated mechanical pulp production are summarized in Table T.5.12. At this stage it is assumed that the wood raw material is 100 percent chips, and the product is pulp in slush form.

Table T.5.12. Process Conditions for Production of the Mechanical Pulp Component of SC-Paper

Mechanical Pulp Integrated		Alta	B.C.	Can. East	U.S. South	U.S. PNW	U.S. North	Finland
Wood Raw Mat.		TMP SWD	TMP SWD	TMP SWD	TMP SWD	TMP SWD	TMP SWD	TMP SWD
Refining yield	%	95	95	95	95	95	95	95
Bleach yield	%	98	98	98	98	98	98	98
H_2O_2	%	2.5	3	2.5	4	4	3	2.5
Na_2SiO_3	%	3	3	3	3	3	3	3
Refining power demand, kWh/tp		2450	2500	2450	3020	2500	2400	2400
Other power demand kWh/tp		300	300	300	300	300	300	300
Fiber and wood losses	%	5	5	5	5	5	5	5
Heat recovered to steam	%[1]	50	50	50	50	50	50	50

1) Percent of refining power input.

Table T.5.13 shows the main data for the SC paper mill.

Table T.5.13. Main Data for the SC paper Mill

		Alt 1	Alt 2	B.C.	Eastern Canada	U.S. South	U.S. PNW	U.S. North	Finland
Wood demand	ODT/tp	0.42	0.63	0.63	0.63	0.60	0.63	0.63	0.63
Fiber demand									
TMP	ADt/tp	0.42	0.61	0.61	0.61	0.58	0.61	0.61	0.61
Purchased CTMP	ADt/tp	0.24							
Purchased BK	ADt/tp	0.125	0.18	0.18	0.18	0.21	0.18	0.18	0.18
Clay demand	ODt/tp	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Chemicals	kg/tp								
H O	kg/tp	10	14	17	14	21	17	14	14
Na SiO	kg/tp	12	17	17	17	16	17	17	17
Ret. aid	kg/tp	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Alum	kg/tp	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Other	kg/tp	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Labour									
Maintenance	h/tp	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Operating	h/tp	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Other	h/tp	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
Maintenance mat'ls	% on investment	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Heat									
Paper Mill	GJ/tp	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Heat recovered from TMP/CTMP mill	GJ/tp	1.8	2.7	2.7	2.7	3.2	2.7	2.7	2.7
Net heat	GJ/tp	2.7	1.8	1.8	1.8	1.3	1.8	1.8	1.8
Power									
TMP	kWh/tp	1,150	1,675	1,710	1,675	1,925	1,710	1,675	1,675
PM	kWh/tp	450	450	450	450	450	450	450	450
Other	kWh/tp	300	300	300	300	300	300	300	300
Total	kWh/tp	1,900	2,425	2,460	2,425	2,675	2,460	2,425	2,425

5.6.2 Cost Comparison of SC Paper Manufacturing

The operating costs were calculated from the process data given in Table T.5.13 and the unit costs defined earlier. Typical industry data for packaging materials, supplies, sales costs and overhead were added to the operating costs.

Fixed capital costs were included based on 15 years depreciation at 10% interest calculated as equal annual payments on the fixed investment.

Because of the significant differences in freight costs between the competitors and market areas, Alberta's competitiveness is shown for three destination areas:

- Los Angeles
- Chicago and
- China (Xing Yang)

The costs are summarized in Table T.5.14 (with freight to the Los Angeles area). Corresponding bar charts are shown in Figures F.5.1, F.5.2, and F.5.3 for the different destinations Los Angeles, Chicago and China.

Table T.5.14. Comparison of Manufacturing Costs of SC Paper

	Alta. Alt 1	Alta. Alt 2	B.C.	Canada East	U.S. South	U.S. PNW	U.S. North	Finland
			(CAD/ton paper)					
Chips & Purch pulp	237	158	156	174	170	155	165	220
Chemicals	93	102	93	84	81	100	82	66
Energy	51	63	65	66	149	76	139	126
Labour	74	77	81	80	84	111	85	74
Other1)	115	120	121	118	118	120	120	120
Total oper. cost	570	520	516	522	602	562	591	606
Cap. chg	220	237	249	225	222	242	238	237
Freight to L.A.	147	147	127	220	150	77	250	133
TOTAL	937	904	892	967	974	881	1080	976

1) Other includes maintenance materials, supplies, packing materials, sales costs and overhead.

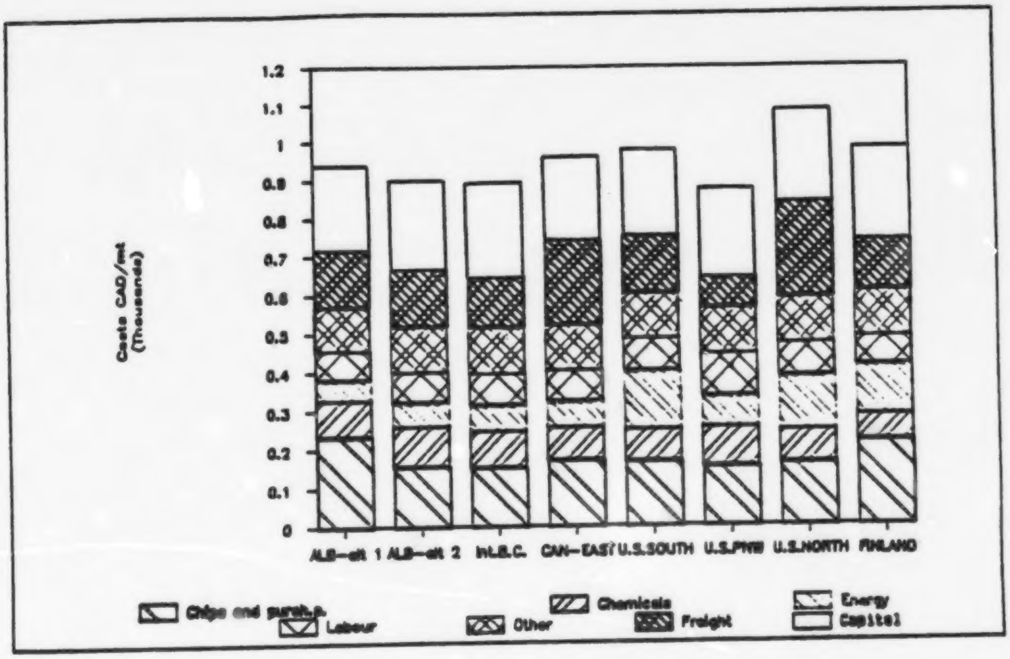


Figure F.5.1. SC PAPER SALES PRICE REQUIREMENT, DELIVERED TO LOS ANGELES

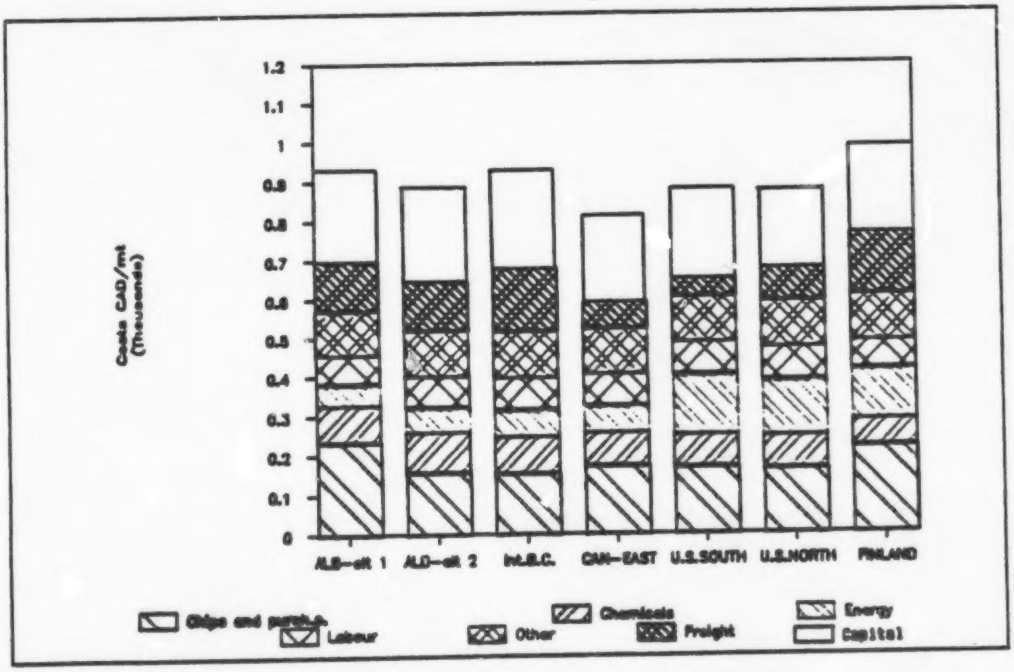


Figure F.5.2. SC PAPER SALES PRICE REQUIREMENT, DELIVERED TO CHICAGO

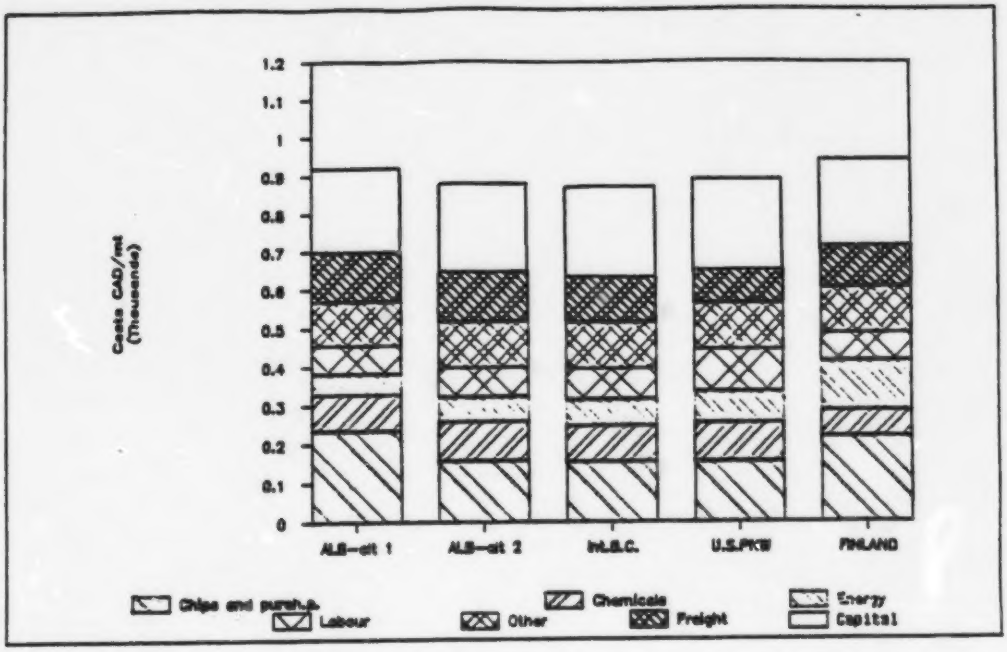


Figure F.5.3. SC PAPER SALES PRICE REQUIREMENT, DELIVERED TO CHINA

Based on Table T.5.15 and Figures F.5.1, F.5.2 and F.5.3, it can be concluded that only the British Columbia mills should have lower operating costs than the Albertan ones.

With the product delivered to the Los Angeles area, British Columbia and the U.S. Pacific Northwest are in a better position. In the Chicago area the U.S. South and Eastern Canada would have lower costs. In China again only British Columbia would be in a more favorable cost situation.

The differences in total costs between Alberta, British Columbia and the Pacific Northwest are relatively minor with respect to the Los Angeles and China market areas.

5.7 Manufacturing Cost Comparison of LWC Paper Production

5.7.1 Basic Data

The LWC paper manufacturing is based on an integrated production of bleached softwood thermomechanical pulp and purchased bleached kraft softwood pulp. As in the SC paper case an alternative concept for Alberta was included, based on integrated TMP production and purchased bleached CTMP and bleached kraft pulp.

Table T.5.15. Summarizes the paper furnish used in the comparison.

Table T.5.15. Furnish for LWC Paper

	Alta. Alt 1	Alta. Alt 2	B.C.	Canada East	U.S. South	U.S. PNW	U.S.	Finland
Basis wt g/m^2	60	60	60	60	60	60	60	60
Coating, g/m^2/side	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5
Furnish (% of paper)								
BK swd	22.7	29.3	29.3	29.3	29.3	29.3	29.3	29.3
CTMP hwd	13	0	0	0	0	0	0	0
TMP, swd	29.3	35.7	35.7	35.7	35.7	35.7	35.7	35.7
Coating	35	35	35	35	35	35	35	35

Table T.5.16 summarizes the production and the fiber and wood demands of the LWC paper mill.

Table T.5.16. Production and Wood Demand for LWC Paper Mill

		Alberta		Other
		Alt. 1	Alt. 2	Areas
Production	tp/yr	175,000	175,000	175,000
Fiber demand				
TMP (integrated)	ADt/yr	54,000	65,900	65,900
Purchased BCTMP	ADt/yr	24,000	--	
Purchased BK	ADt/yr	41,900	54,000	54,000
Coating material demand	BDT/yr	60,000	60,000	60,000
Wood demand	BDT/yr	55,000	66,500	66,500
Fiber losses	%	2	2	2
Clay losses	%	5	5	5

The main data for the integrated mechanical pulp production are summarized in Table T.5.17. At this stage it is assumed that the wood raw material is 100% chips, and the product is bleached TMP pulp in slush form.

Table T.5.17. Process Conditions for Production of the Mechanical Pulp Component of LWC Paper

		Alta	B.C.	Canada East	U.S. South	U.S. PNW	Finland
Mech. Pulp Integrated		TMP	TMP	TMP	TMP	TMP	TMP
Wood raw mat.		SWD	SWD	SWD	SWD	SWD	SWD
Refining yield	%	95	95	95	93	95	95
Bleach yield	%	98	98	98	98	98	98
H_2O_2	% on pulp	2.5	3	2.5	4	3	2.5
Na_2SiO_3	% on pulp	3	3	3	3	3	3
Refining power demand KWh/Adt		2650	2700	2650	3200	2700	2600
Other power demand KWh/Adt		300	300	300	300	300	300
Fiber and wood losses	%	5	5	5	5	5	5
Heat recovery degree	%1)	50	50	50	50	50	50

1) Percent of refining power input.

Table T.5.18 summarizes the main data for the LWC paper mill.

Table T.5.18. Data for the LWC Paper Mill

		Alberta Alt 1	Alberta Alt 2	B.C.	Eastern Canada	U.S. South	U.S. PNW	Finland
Wood demand	ODT/tp	0.31	0.38	0.38	0.38	0.38	0.38	0.38
Fiber demand								
TMP	ADt/tp	0.31	0.38	0.38	0.38	0.38	0.38	0.38
Purchased CTMP	ADt/tp	0.14						
Purchased BK	ADt/tp	0.24	0.31	0.31	0.31	0.31	0.31	0.31
Coating material demand	ODt/tp	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Chemicals	kg/tp							
H O	kg/tp	10	14	17	14	21	17	14
Na SiO	kg/tp	12	17	17	17	16	17	17
Ret. aid	kg/tp	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Alum	kg/tp	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Other	kg/tp	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Labour								
Maintenance	h/tp	1.31	1.31	1.31	1.31	1.31	1.31	1.31
Operating	h/tp	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Other	h/tp	0.51	0.51	0.51	0.51	0.51	0.51	0.51
Maintenance mat'ls	% on	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Heat								
Paper Mill	GJ/tp	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Heat recovered from TMP/CTMP mill	GJ/tp	1.5	1.9	1.9	1.9	2.2	1.9	1.9
Net heat	GJ/tp	5.0	4.7	4.6	4.6	4.3	4.7	4.6
Power								
TMP	kWh/tp	950	1,160	1,180	1,160	1,380	1,180	1,160
PM	kWh/tp	500	500	500	500	500	500	500
Other	kWh/tp	300	300	300	300	300	300	300
Total	kWh/tp	1,750	1,960	1,980	1,960	2,180	1,980	1,960

5.7.2 Cost Comparison of LWC Paper Manufacturing

The operating costs were calculated from the process data given in Table T.5.19. Typical industry data for packaging materials, supplies, sales costs and overhead were then added to these costs.

Fixed capital costs were included based on 15 years depreciation time at 10 percent interest calculated as equal annual payments on fixed investment.

As for the SC-paper grade, the competitiveness of Alberta is shown for three destination areas.

- Los Angeles
- Chicago
- China (Xing Yang)

The costs are summarized in Table T.5.19 with freight to the Los Angeles area. Corresponding bar charts are shown in Figures F.5.4, F.5.5 and F.5.6 for the different destinations Los Angeles, Chicago and China.

Table T.5.19. Comparison of Manufacturing Costs of LWC -Paper

	Alta Alt. 1	Alta Alt. 2	B.C.	Canada East	U.S. South	U.S. PNW	Finland
			(CAD/ton paper)				
Chips and Purch. pulp	246	227	224	237	215	224	265
Chemicals	233	237	225	199	184	200	189
Energy	53	57	66	70	133	68	114
Labour	77	80	83	82	85	115	73
Other[1]	115	116	110	115	116	118	113
Total oper.	724	717	708	704	733	725	754
Capital chg.	223	230	242	219	219	234	204
Freight (to L.A.)	147	147	127	220	150	77	133
TOTAL	**1094**	**1094**	**1077**	**1142**	**1102**	**1036**	**1091**

1) Other includes maintenance materials, supplies, packing materials, sales costs and overhead.

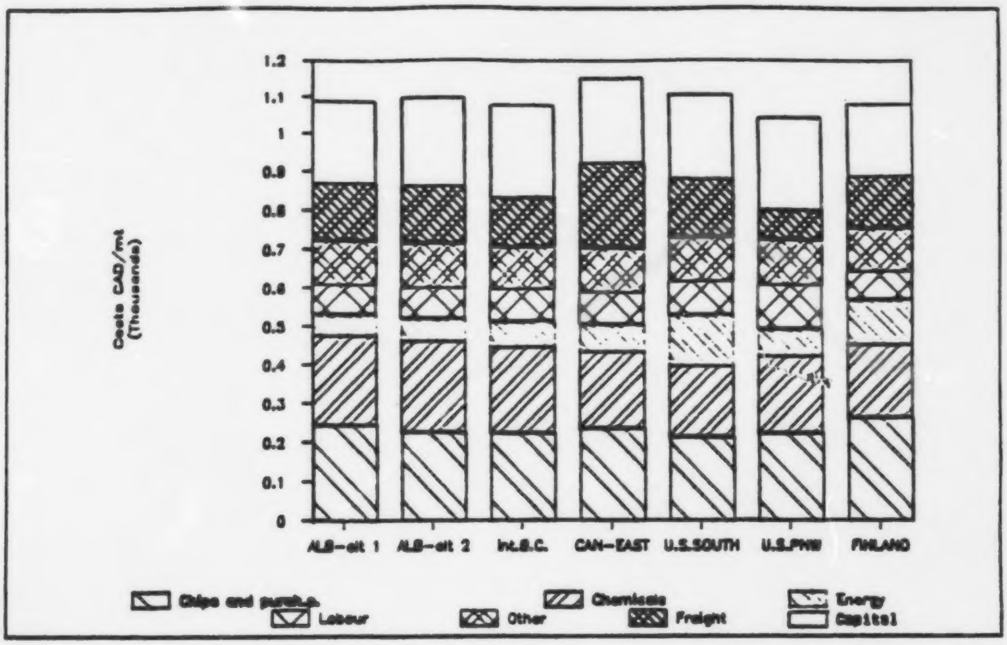


Figure F.5.4. SALES PRICE REQUIREMENT OF LWC PAPER DELIVERED TO LOS ANGELES

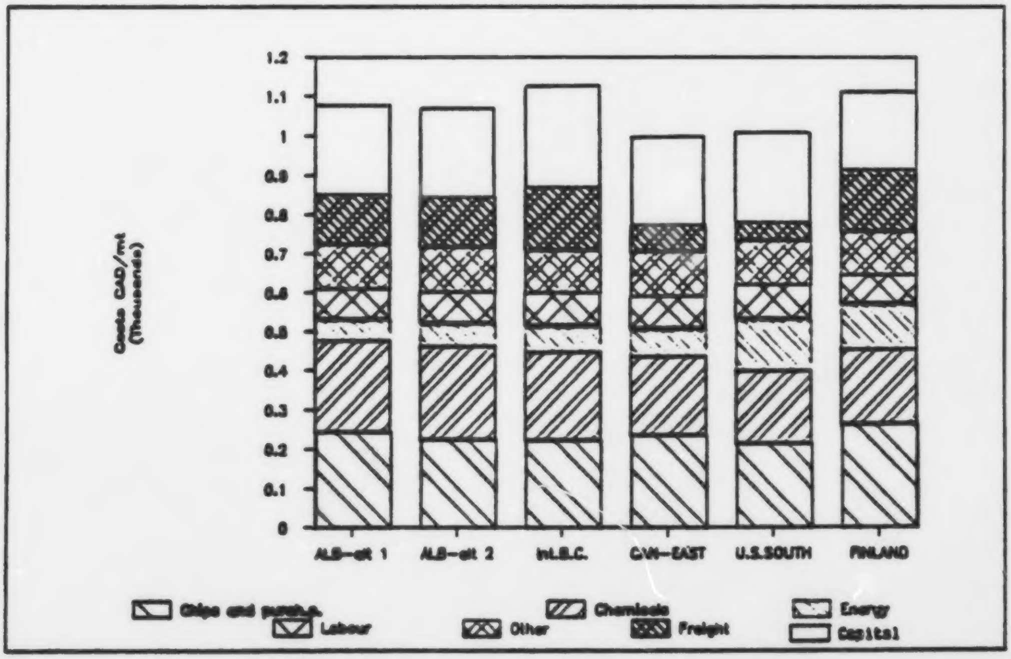


Figure F.5.5. SALES PRICE REQUIREMENT OF LWC PAPER DELIVERY TO CHICAGO

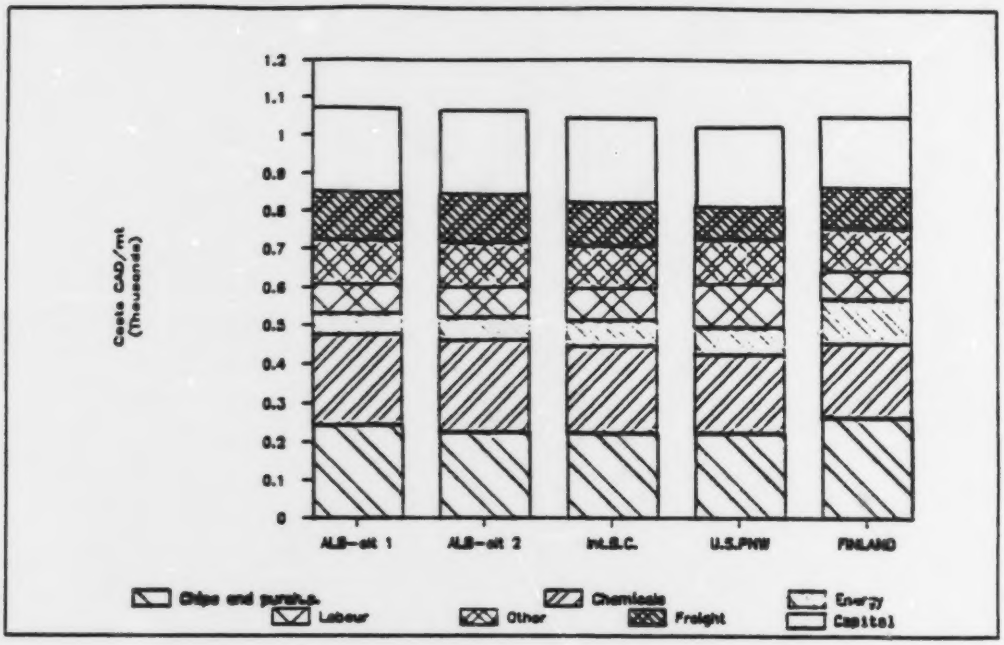


Figure F.5.6. SALES PRICE REQUIREMENT OF LWC PAPER DELIVERED TO CHINA

In the LWC paper case, the operating costs are calculated to be lower both in British Columbia and Eastern Canada than in the Albertan mill. The operating cost differences between the competing areas are less pronounced than in the SC paper case. This is due to the fact that LWC paper uses high amounts of coating materials which are not manufactured in the areas with low energy and/or wood costs.

The bar charts presented in Figures F.5.4, F.5.5 and F.5.6. for the major market areas Los Angeles, Chicago and China show again that Alberta can be competitive in the Los Angeles area and the Pacific Rim. Mills in the U.S. South (and also Midwest and Southeast) and Eastern Canada can deliver LWC paper to Chicago area at about 10 percent lower cost than an Albertan mill.

5.8 Manufacturing Cost Comparison of Newsprint Production

5.8.1 Basic Data

The newsprint manufacturing is based on an integrated production of unbleached softwood thermomechanical pulp and purchased semibleached softwood kraft pulp. An alternative concept for Alberta was included, based on integrated production of softwood and hardwood CTMP utilizing no purchased pulp. As in all cases the furnishes are indicative only and will have to be proved in trials.

Table T.5.20 summarizes the paper furnish used in the comparisons.

Table T.5.20. Furnish for Newsprint

	Alta Alt 1	Alta Alt 2	B.C.	Quebec	U.S. South	U.S. West	Norscan[2)]
Basis wt, g/m^2	48.8	48.8	48.8	48.8	48.8	48.8	48.8
Furnish. %							
CTMP, swd	60	0	0	0	0	0	0
CTMP, hwd	40	0	0	0	0	0	0
TMP, swd	0	90	90	90	85	90	90
SBK, swd[1)]	0	10	10	10	15	10	10

1) Semibleached kraft pulp
2) Finland and Sweden

Table T.5.21 summarizes the production and the fiber and wood demands of the newsprint mill.

Table T.5.21. Production, Fiber and Wood Demand for the Newsprint Mill

		Alta Alt. 1	Alt. 2	U.S. South	Other Areas
Production	tp/yr	175,000	175,000	175,000	175,000
Fiber demand					
TMP (integrated)	ADt/yr	0	166,000	157,000	166,000
CTMP, hwd (integrated)	ADt/yr	73,800	0	0	0
CTMP, swd (integrated)	ADt/yr	110,700	0	0	0
Purchased SBK	ADt/yr	0	18,500	27,500	18,500
Wood demand, swd	BDT/yr	11,000	166,000	158,000	166,000
hwd		75,000			
Fiber losses, hwd %		2	2	2	2

The main data for the integrated mechanical pulp production are summarized in Table T.5.22. At this stage, it is assumed that the wood raw material is 100 percent chips, and the product is unbleached mechanical pulp in slush form.

Table T.5.22. Process Conditions for Production of the Mechanical Pulp Component of Newsprint

		Alta Alt 1		Alta Alt 2	B.C.	Can. East	U.S. South	U.S. PNW	Norscan (2)
Mech. pulp integrated		CTMP	CTMP	TMP	TMP	TMP	TMP	TMP	TMP
Wood raw mat.		SWD	HWD	SWD	SWD	SWD	SWD	SWD	SWD
Refining yield	%	94	92	95	95	95	93	95	95
Na_2SO_3	%	2.5	3.0						
Refining power demand		2100	1800	2300	2400	2300	2900	2350	2250
Other power demand		300	300	300	300	300	300	300	300
Fiber and wood losses	%	5	5	5	5	5	5	5	5
Heat recovery degree	%(1)	35	35	50	50	50	50	50	50

(1) Percent of refining power input.
(2) Finland and Sweden

Table T.5.23 summarizes the main data for the newsprint mill.

Table T.5.23. Main Data for the Newsprint Mill

		Alberta Alt 1	Alberta Alt 2	B.C.	Eastern Canada	U.S. South	U.S. PNW	Norscan1)
Wood demand	ODT/tp	1.06	0.95	0.95	0.95	0.90	0.95	0.95
Fiber demand								
TMP (integrated	ADt/tp	0	0.95	0.95	0.95	0.90	0.95	0.95
Purchased BK	ADt/tp	0	0.10	0.10	0.10	0.15	0.10	0.10
CTMP, hwd (integrated)	ADt/tp	0.42						
Chemicals	kg/tp							
NaOH	kg/tp	4	0	0	0	0	0	0
Na SO		29	0	0	0	0	0	0
Ret. aid	kg/tp	2	2	2	2	2	2	2
Alum	kg/tp	8	8	8	8	8	8	8.0
Other	kg/tp	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Labour								
Maintenance	h/tp	1.3	1.28	1.28	1.28	1.28	1.28	1.28
Operating	h/tp	1.53	1.5	1.5	1.5	1.5	1.5	1.5
Other	h/tp	0.49	0.49	0.49	0.49	0.49	0.51	0.51
Maintenance mat'ls	% on	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Heat								
Paper Mill	GJ/tp	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Heat recovered from TMP/CTMP mill	GJ/tp	2.2	4.0	4.0	4.0	4.0	4.0	4.0
Net heat	GJ/tp	1.8	0	0	0	0	0	0
Power								
TMP	kWh/tp	2,160	2,275	2,375	2,275	2,720	2,325	2,225
PM	kWh/tp	400	400	400	400	400	400	400
Other	kWh/tp	2,860	2,975	3,075	2,975	3,420	3,025	2,925

1) Finland and Sweden

5.8.2 Cost Comparison of Newsprint Manufacturing

The operating costs were calculated from the process data given in Table T.5.23 and the unit cost defined earlier. Typical industry data for packaging materials, supplies, sales costs and overhead were added to the operating costs.

Fixed capital costs were included based on 15 years' depreciation time at 10 percent interest calculated as equal annual payments on fixed investment.

As for the other paper grades, Alberta's competitiveness is shown for three destination areas:

- Los Angeles
- Chicago
- China (Xing Yang)

The manufacturing costs for newsprint delivered to the Los Angeles area are detailed in Table T.5.24.

Table T.5.24. Manufacturing Costs of Newsprint (TMP based), Delivered to Los Angeles

	Alta. Alt 1	Alta. Alt 2	B.C.	Canada East	U.S. South	U.S. PNW	Finland	Sweden
			(CAD/ton/newsprint)					
Chips & Purch pulp	79	130	124	153	155	125	223	210
Chemicals	28	5	5	5	4	4	4	7
Energy	79	77	79	74	198	99	159	117
Labour	77	75	79	78	82	108	71	96
Other	102	98	94	96	95	98	90	90
Total oper. cost	365	385	381	406	534	434	547	520
Fixed Cap. chg	272	253	265	240	235	259	252	250
Freight to L.A.	147	147	127	220	150	77	133	120
TOTAL	784	785	773	866	919	770	932	890

1) Other includes maintenance materials, supplies, packing materials, sales cost and overhead.

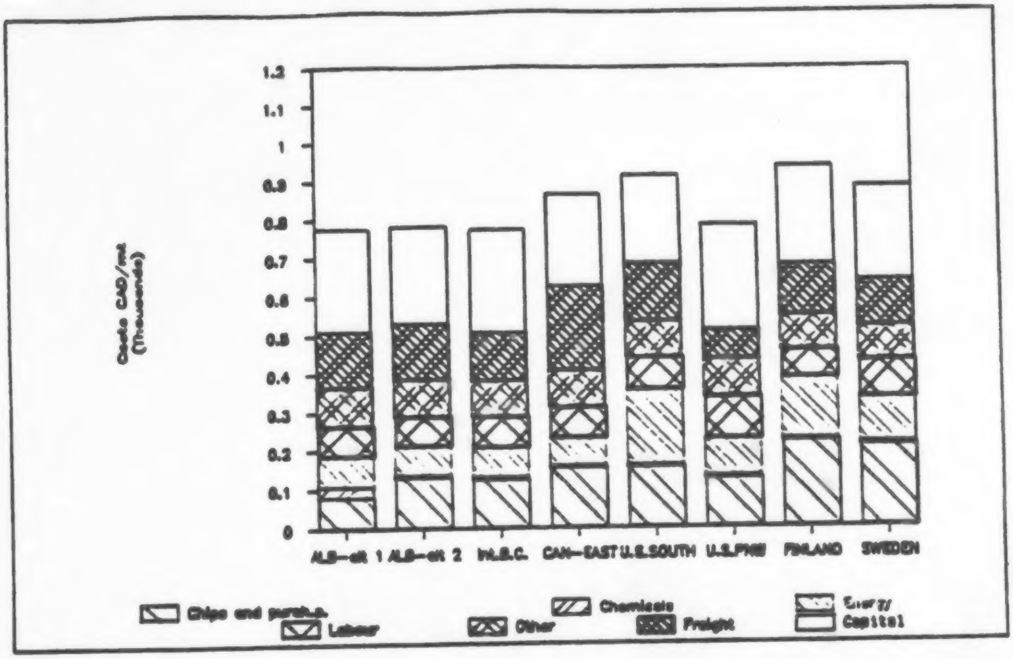


Figure F.5.7. SALES PRICE REQUIREMENT OF NEWSPRINT DELIVERED TO LOS ANGELES AREA

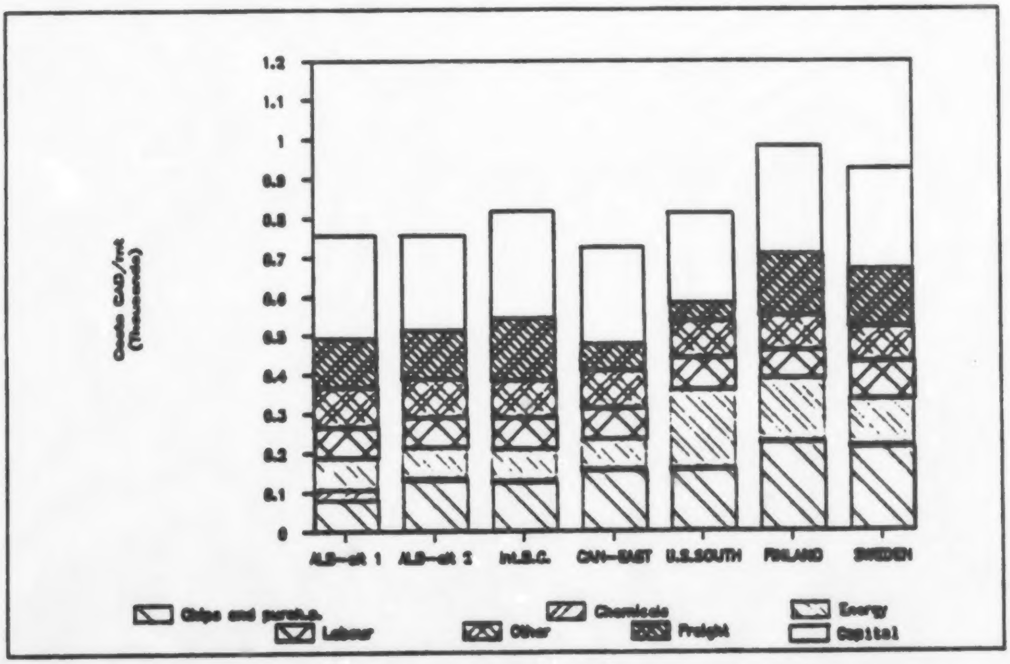


Figure F.5.8. SALES PRICE REQUIREMENT OF NEWSPRINT DELIVERED TO CHICAGO AREA

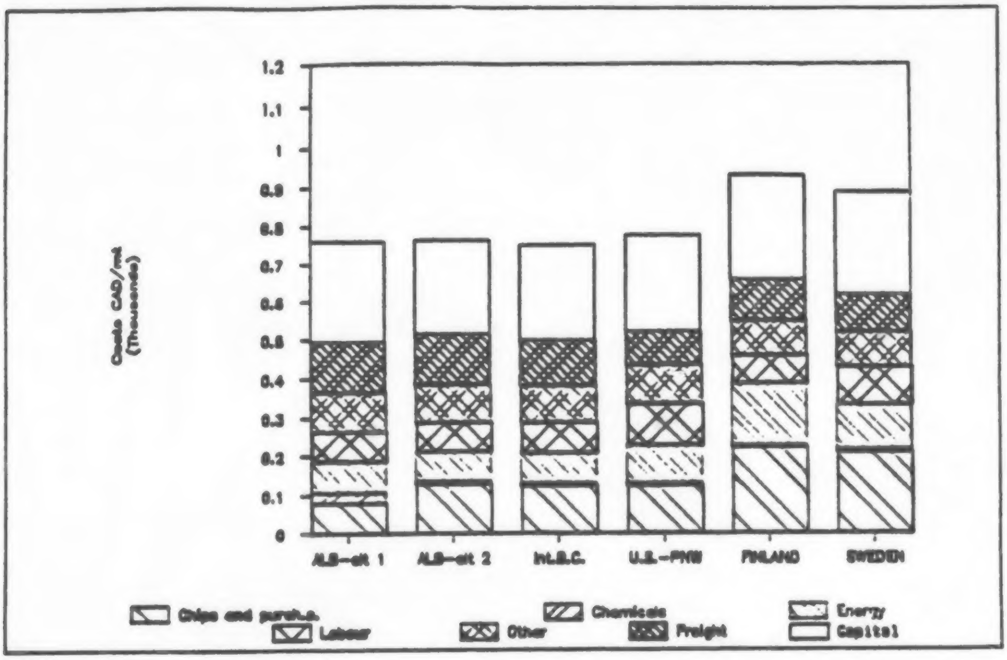


Figure F.5.9. SALES PRICE REQUIREMENT OF NEWSPRINT DELIVERED TO CHINA

Again it is evident that Alberta is competitive mainly in the Los Angeles and Pacific Rim areas. The cost difference between the interior B.C. and U.S. Pacific Northwest is very minor (1-1.5 percent of the total costs).

5.9 Manufacturing Cost Comparison of Folding Carton Production

5.9.1 Basic Data

The folding carton studied here is a multiply board utilizing mechanical pulp produced at the mill site, as well as purchased kraft pulp. The mechanical pulp component can be any mechanical pulp, i.e. groundwood, thermomechanical or chemithermomechanical pulp. In this comparison, bleached CTMP was used as the mechanical pulp.

The carton is a three ply board with bleached kraft pulp as top and backliner, and mechanical pulp and broke as middle layer. The carton in this example is one side coated carton.

Table T.5.25 summarizes the furnish used in the comparison.

Table T.5.25. Paper Furnish for Folding Carton Board, One Side Coated (Same furnish for all areas)

Basis wt	g/m^2	240
Bleached CTMP	%	49
BK swd	%	23
BK hwd	%	15
Coat and clay	%	12
Size	%	1
TOTAL	%	100

The mill size was selected to 130,000 t/yr, which was considered justifiable by the available market. The fiber and wood demands are shown in Table T.5.26.

Table T.5.26. Fiber and Wood Demands for the Folding Carton Board Mill

Production	tp/yr	130,000
Fiber demand		
Bleached CTMP, swd, integrated	ADt/yr	66,000
Purchased BK hwd	ADt/yr	31,500
Purchased BK swd	ADt/yr	21,000
Wood demand	BDT/yr	67,000
Clay and coating mat'ls	BDT/yr	15,000
Size	BDT/yr	1,300

The process conditions for the integrated CTMP mill are summarized in Table T.5.27.

Table T.5.27. Process Conditions of CTMP mill integrated with the Folding Carton Board Mill

		Alta	B.C.	Canada East	U.S. South	U.S. NW	Finland
Refining yield	%	94	93	93	92	93	94
Na_2SO_3, % on wood		2.5	3	3	4	3	2.5
H_2O_2 % on plp		2.5	3	3	4	3	2.5
Na_2SiO_3	%	3	3	3	3	3	3
Refining power	kWh/ADt	2100	2100	2100	2700	2100	2100
Wood and fiber losses	%	5	5	5	5	5	5
Heat recovery	%	35	35	35	35	35	35

1) Percent of refiner power input.

The main data for the folding carton board mill is shown in Table T.5.28

Table T.5.28. Main Data for Folding Carton Board Mill

		Alberta	B.C.	Eastern Canada	U.S. South	U.S. PNW	Finland
Wood demand	ODT/tp	0.51	0.51	0.51	0.52	0.51	0.50
Fiber demand							
TMP	ADt/tp	0.61	0.61	0.61	0.58	0.61	0.61
Purchased BK, hwd	ADt/tp	0.18	0.18	0.18	0.21	0.18	0.18
Purchased BK, swd	ADt/tp						
Clay and coating	t/tp	0.11	0.24	0.24	0.24	0.24	0.24
Chemicals	kg/tp						
NaOH	kg/tp	13	15	15	20	15	13
Na SO		12	14	14	18	14	12
Ret. aid	kg/tp	3.0	3.0	3.0	3.0	3.0	3.0
Alum	kg/tp	4.0	4.0	4.0	4.0	4.0	4.09
Starch	kg/tp	0.7	0.7	0.7	0.7	0.7	0.7
Labour							
Maintenance	h/tp	1.1	1.1	1.1	1.1	1.1	1.1
Operating	h/tp	2.5	2.5	2.5	2.5	2.5	2.5
Other	h/tp	0.46	0.46	0.46	0.46	0.46	0.46
Maintenance mat'ls	% on	1.5	1.5	1.5	1.5	1.5	1.5
Heat							
Paper Mill	GJ/tp	4.5	4.5	4.5	4.5	4.5	4.5
Heat recovered from TMP/CTMP mill	GJ/tp	1.1	1.1	1.1	1.1	1.1	1.1
Net heat	GJ/tp	1.8	1.8	1.8	1.8	1.8	1.8
Power							
TMP	kWh/tp	1,250	1,250	1,250	1,250	1,250	1,250
PM	kWh/tp	450	450	450	450	450	450
Other	kWh/tp	300	300	300	300	300	300
Total	kWh/tp	2,000	2,000	2,000	2,000	2,000	2,000

5.9.2 Cost Comparison of Folding Carton Board Production

The operating costs were calculated from the process data given in Table T.5.28 and the unit cost defined earlier. Typical industry data for packaging materials, supplies, sales costs and overhead were added to the operating costs.

Fixed capital costs were included based on 15 years depreciation time at 10 percent interest calculated as equal annual payments on fixed investment.

As for the other paper grades, Alberta's competitiveness is shown for three destination areas:

- Los Angeles
- Chicago
- China (Xing Yang)

Table T.5.29 summarizes the cost with freight to the Los Angeles area.

Table T.5.29. Folding Carton Board Manufacturing Costs

TOTAL	Alberta	B.C.	Canada East (CAD/ton)	U.S. South	U.S. PNW	Finland
Chips & purch. pulps	291	288	305	276	289	343
Chemical	102	98	92	87	85	77
Energy	59	68	74	138	66	119
Labour	89	94	93	98	129	79
Other	111	112	112	111	110	111
Total oper. cost	652	660	676	710	679	729
Capital chg.	247	251	253	244	239	241
Freight to L.A.	147	127	220	195	77	133
TOTAL	**1046**	**1038**	**1149**	**1149**	**995**	**1103**

Figures F.5.10, F.5.11 and F.5.12 summarize the costs as delivered to Los Angeles, Chicago and China.

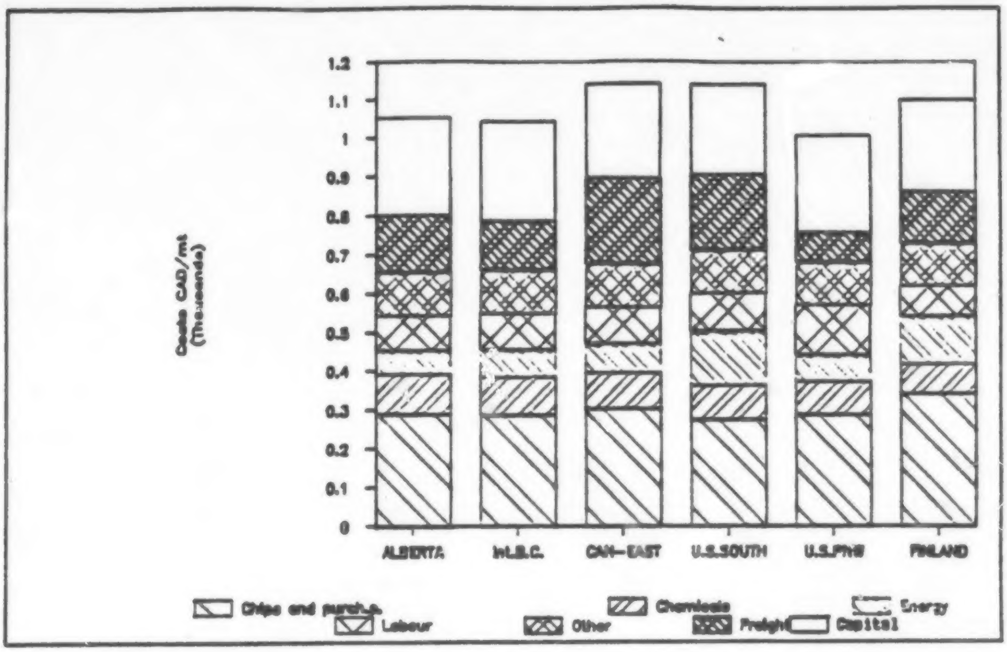


Figure F.5.10. SALES PRICES REQUIREMENT OF FOLDING CARTON DELIVERED TO LOS ANGELES AREA

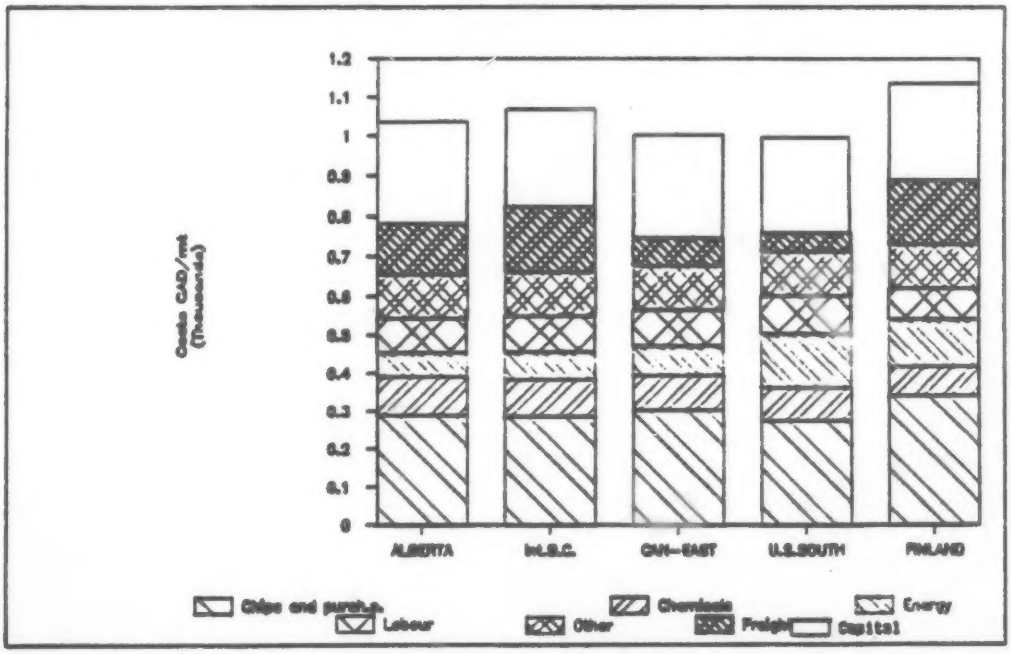


Figure F.5.11. SALES PRICE REQUIREMENT OF FOLDING CARTON DELIVERED TO CHICAGO AREA

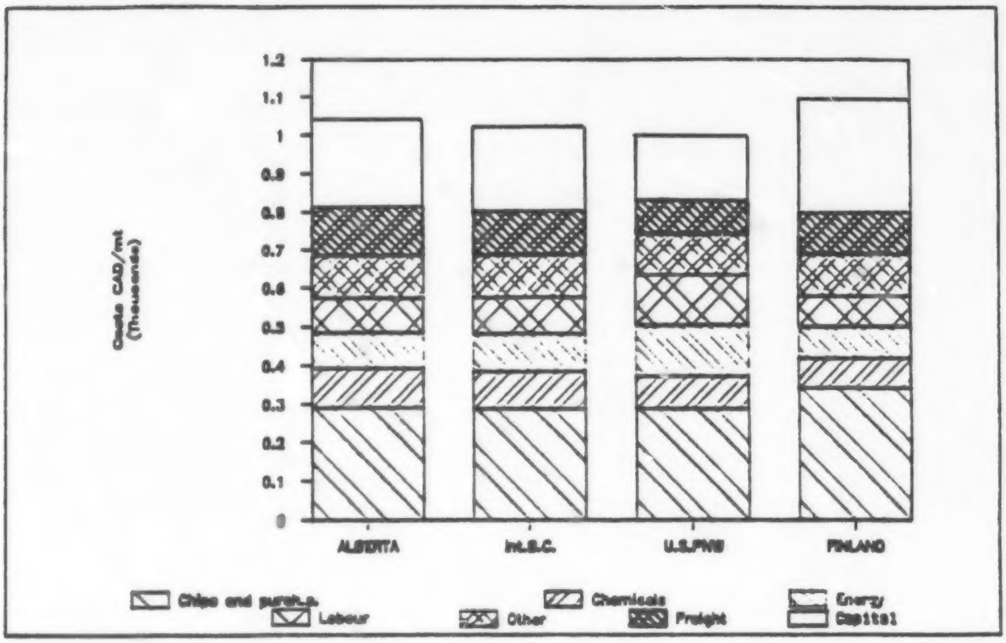


Figure F.5.12. SALES PRICE REQUIREMENT OF FOLDING CARTON DELIVERED TO CHINA

The operating costs in Alberta are calculated to be the lowest among the competing areas. The disadvantage in freight costs makes Alberta competitive only in the Los Angeles and Pacific Rim areas, as evident from the bar charts shown in Figures F.5.10, F.5.11 and F.5.12.

5.10 Conclusion Based on the Cost Comparison

Based on the cost comparisons undertaken it is evident that one of Alberta's disadvantages is its distance to the market area. The operating costs are the lowest among the competing areas for all grades but LWC paper. The freight disadvantage, however, results in that Alberta becomes second to British Columbia and U.S. Pacific Northwest for the main market areas, the Los Angeles and Pacific rim area. On the Chicago market Eastern Canada will always have the low freight benefits.

The cost comparison and the market study indicate that Alberta's biggest potential is in SC paper and folding carton production.

In an interim project meeting on April 3, 1987, these two products were recommended by EKONO to be selected for further financial analysis.

In later discussions it was, however, agreed that the two products for further analysis will be SC paper and LWC paper. These two paper grades are evaluated more carefully in Section 6.

6. ANALYSIS OF A VALUE ADDED PAPER MANUFACTURING FACILITY IN ALBERTA

6.1 Mill Production Level

The Albertan paper production is assumed to start in a single machine mill. The optimum machine size depends in general on the following factors:

- Expected market volume
- Cost minimum defined by investment and operating costs

The cost minimum is typically defined by the maximum practical size of a single machine. For a printing paper machine this size is now 170,000-200,000 tp/yr. Based on this and on the market forecast for the SC paper, the production of SC paper has been evaluated at a production level of 175,000.

The capacity of the LWC paper mill was selected at 175,000 tp/yr, which is in the same range as the newest machines installed (170,000 - 200,000 tp/yr).

6.2 Evaluation of the SC Paper Mill

6.2.1 Paper Furnish and Product End Use of the SC Paper Mill

Several alternative furnishes can be used to produce SC paper. Some examples are shown in Table T.6.1.

Table T.6.1. Furnishes for SC Paper

	Recipe Alternative				
	1	2	3	4	5
Component, % of paper					
SGW	54-64				
PGW		50-70			
RMP			55-65		
TMP				62-75	50-70
Bleached kraft	20-30	12-22	15-30		5-10
CTMP, hardwood				6-20	10-20
Filler	15-27	15-27	15-27	15-27	15-27

Important properties for good SC papers include:

1. Good printing properties
    - surface
    - printing ink absorption
    - on offset grade: surface strength (picking resistance)

2. Sufficient strength for runnability
3. Uniform quality
4. Sufficient brightness and opacity (higher requirements than on newsprint)

SC papers are used for

1. Newspaper special issues (weekend issues, colored pages)
2. Magazines
3. Advertising leaflets
4. Mail order catalogues

6.2.2 Production Program for the SC Paper Mill

The basis weight range for supercalendared magazine paper (SC) is 55-70 g/m^2 and the filler content of the paper is 20-30 percent. The high filler content deteriorates the strength properties of the paper and therefore 15-20 percent of chemical pulp must be used when mechanical pulp (e.g. White Spruce) is produced by the TMP process. The SC paper is finished by supercalender to give the paper a smooth surface and good printing properties. The average basis weight and fiber composition of SC paper, used in the calculations, is as follows:

Basis weight	60 g/m^2
Furnish, percent of paper	
- chemical pulp	17
- TMP	58
- filler	25

The quality of the mechanical pulp must be considerably higher for SC paper than for e.g. newsprint, thus also the specific power consumption is higher. SC papers are often used for color prints, and the requirements of runnability and printing properties are important.

From a market point of view, it could be advantageous to be prepared to produce other printing grades as well, e.g. newsprint, directory paper, in the SC paper mill. This would require scaling up the wood handling and the TMP plant for the newsprint furnish (90-95 percent TMP and 5-10 percent semibleached kraft). The machine concept could also be slightly different.

Although these provisions could be highly motivated to improve the flexibility due to market fluctuations, they are not considered in this evaluation.

6.2.3 Process Description of the SC Paper Mill

A block diagram showing the SC paper mill is included in Figure F.6.1.

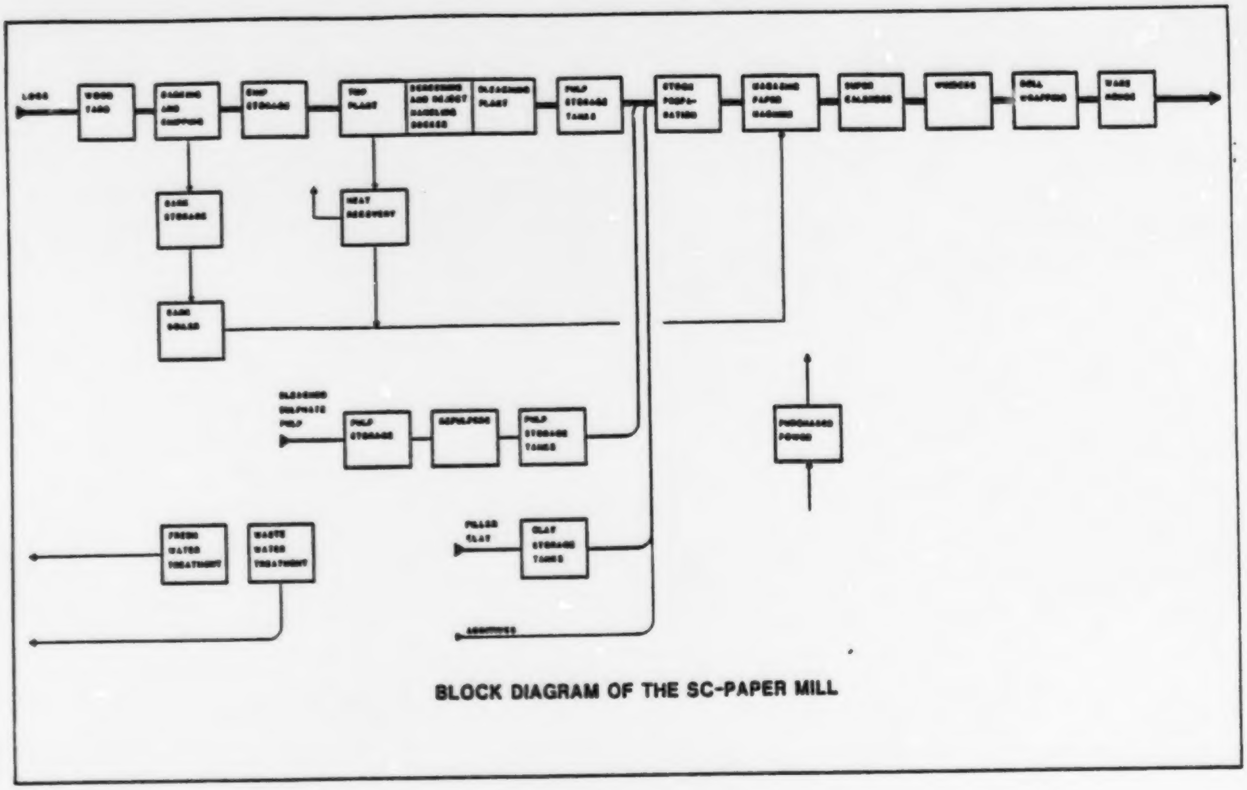
WOOD HANDLING

The integrated mechanical pulp mill will require about 109,000 BDT/yr of softwood chips. Provisions for operating on 100 percent roundwood is included;, the cost calculations however, are based on a roundwood/purchased chips ratio of 62/38 (See also Table T.2.4).

The capacity of the wood handling is 250,000 solid m^3/yr or 60 m^3/h when operating five days a week in two shifts (16 h/d).

The logs arrive at the mill by trucks and are measured and weighed at the scaling station. From there they are transported either to the wood receiving desk or to the wood yard.

From the infeed deck the logs are transported by conveyor to one dry debarking drum. After the drum the logs are sorted. The debarked logs proceed to a chipper. Chips are screened and transported to a chip pile. Purchased chips are weighed on the truck and taken to chip screening and chip pile.



LOGS
WOOD YARD
BARKING AND CHIPPING
CHIP STORAGE
TMP PLANT
SCREENING AND REJECT HANDLING
BLEACHING PLANT
PULP STORAGE TANKS
STOCK PREPA-RATION
MAGAZINE PAPER MACHINE
SUPER CALENDER
WINDERS
ROLL WRAPPING
WARE HOUSE
BARK STORAGE
HEAT RECOVERY
BARK BOILER
BLEACHED SULPHATE PULP
PULP STORAGE
REPULPERS
PULP STORAGE TANKS
PURCHASED POWER
FRESH WATER TREATMENT
WASTE WATER TREATMENT
FILLER CLAY
CLAY STORAGE TANKS
ADDITIVES
BLOCK DIAGRAM OF THE SC-PAPER MILL

Figure F.6.1. BLOCK DIAGRAM OF THE SC PAPER MILL

TMP PLANT

The screened softwood chips are fed through a chip bin to the chip washer before preheating. High pressure refining is performed in two consecutive stages and the heat from the refiners is recovered for paper drying (approximately 50 percent). After the steam separation from the second refining stage the pulp is discharged to a latency removal tower. After latency removal the pulp is screened, cleaned and dewatered before bleaching. Finally the pulp is bleached with peroxide (H_2O_2) and stored in towers for use in the paper mill.

PAPER MILL

The raw materials for the SC paper machine are softwood TMP, purchased bleached pulp and filler clay. The chemical pulp is refined before going through the cleaning system and entering the headbox. The filler clay is mixed into the water in the slushing station before proportioning to the fiber flow. The paper machine is of fourdrinier type with twinwire section. The paper is finished in supercalenders before packaging and transportation to the warehouse.

POWER STATION

Heat is generated from bark and oil and additional heat recovered from TMP refining. There is no in house electrical energy generation.

ENVIRONMENTAL PROTECTION

The effluent loads expected from the mill to external treatment are as follows:

- Effluent volume	15-20 m^3/tp
- Suspended solids	8 kg/tp
- BOD_5	15-24 kg/tp
- Color	20-25 kb/tp

The effluent treatment system includes a primary clarifier and biological treatment in an aerated lagoon. It is assumed that no color removal is needed. The aerated lagoon will reduce the effluent BOD load by 70-90%.

6.2.4 Operating Cost Estimate

The operating cost estimate is detailed in Table T.6.2 below.

Table T.6.2. Operating Cost of SC Paper Manufacturing
- integrated to mechanical pulp mill
- not integrated to chemical pulp mill

BASIC DATA

Production	1000 t/yr	175
Appx. investment	10^6 CAD	320
Operating days	d/yr	350
Basis wt	g/m^2	60
Furnish		
TMP, swd	%	58
BK, swd	%	17
Filler	%	25

OPERATING COST

	Unit	Unit/tp	CAD/Unit	CAD/tp	CAD/tp
FURNISH					
Chips	BDT	0.63	77	48	
BK, swd	Adt	0.18	640	116	
Filler clay	BDT	0.27	250	65	
Sub-total					229
CHEMICALS					
H_2O_2	kg	14.19	1600	23	
Sodiumsilicate	kg	17.03	320	5	
Wet end chem.				9	
Sub-total					37
	Unit	Unit/tp	CAD/unit	CAD/tp	CAD/tp
UTILITIES					
Steam	GJ	1.8	2.250	4	
Power	kWh	2450.0	0.024	59	
Water	m^3	15.0	-	-	
Sub-total					63
PACK MAT'L					
Core 3"	m	3.0	1.00	3	
Wrp. pap.	m^2	30.0	0.25	8	
Sub-total					11
TOTAL VARIABLE COST					340

LABOUR	Unit		CAD/unit	CAD/tp	CAD/tp
Ave. working time h/year		2000			
Maint. labour	pers. 1)	115	23	30	
Oper. labour	pers. 1)	140	21	31	
Administration	pers. 1)	40	29	13	
Sub-total					77
MAINT. MAT'L	% on inv.	1.5			27
SUPPLIES					
Paper mill				31	
TMP mill				9	
Sub-total					40
ADMIN. AND SALES					30
OVERHEAD					12
TOTAL FIXED COST					**186**
TOTAL OPER. COST					526
FREIGHT					144
TOTAL OPERATING COST INCL. FREIGHT					**670**

1) Total persons working in the mill

6.2.5 Investment Cost Estimate

The rough investment estimate is given for a new SC-paper mill below in Table T.6.3.

Table T.6.3. Estimated Investment Cost

Direct Costs	1000 CAD
Installed equipment, incl. spare parts	214,000
Site	12,000
Buildings	31,000
Freight	10,000
TOTAL DIRECT COSTS	**267,000**
Indirect costs	
Preinvestment studies	3,000
Engineering	23,000
Temporary const. facilities	8,000
Insurance during construction	600
Contingency (6%)	18,400
TOTAL CAPITAL COST	**320,000**

If the TMP plant and the paper machine are installed in an existing mill, the investment cost is estimated to be about 25 percent lower.

6.2.6 Profitability of a SC-Paper Mill

SALES REVENUE

The sales price for SC paper was taken as the price of third quarter in 1986, which was 1079 CAD/tp. The mill net price, excluding sales commissions and freight will then be

Market price	1079 CAD/tp
Sales cost (3%)	32 CAD/tp
Transportation	145 CAD/tp
Mill net price	902 CAD/tp

During the end of 1986 and the beginning of 1987 the SC paper price has somewhat declined.

PRODUCTION DEVELOPMENT

The start-up curve of the mill is assumed to to be as follows:

Year of operation	Production development % of total
1	75
2	90
3	100

During the start-up period the following quality discounts are calculated to be given to the clients.

Year of operation	1	2	3	4	5-13
SC-paper discount, CAD/tp	30	15	8	0	0

OPERATING COSTS

Additional manufacturing costs of fiber, chemicals and energy are also included for the first years of operation due to higher raw material and energy consumptions.

Year of operation	Additional Costs, %
1	2
2	1
3-13	-

INVESTMENTS

Split-up of fixed investment is the following:

Year	% of Total
-2	35
-1 start-up	60
1	5
2-13	-

The annual increase in working capital is considered in the calculations. The total working capital is released at the end of the calculation period.

The working capital is reserved for operations one year before start-up.

CASH FLOW BEFORE FINANCING AND TAXES

The cash flow calculations are based on the following assumptions:

The calculation period is 15 years including two year construction.

All calculations are made in constant Canadian dollars the cost level being the third quarter of 1986.

The profitability of building a new greenfield SC-paper mill is determined by means of internal rate of return calculated on cash flow before financing. Thus the IRR calculated here indicates the average return gained on the invested capital during the calculation period. Also a ROI calculation was carried out for a typical year of operation.[1]

A summary of the profitability calculations is shown in Table T.6.4.

1) $\left(\text{ROI \%} = \frac{\text{100 x operating profit}}{\text{total capital requirement}}\right)$

Table T.6.4. Summary of Profitability Calculations

Greenfield SC-paper mill in Northeastern Alberta, 175,000 t/a

	Ref. Year 6 1000 CAD	Per ton of Product CAD/t	Percent of Sales
Production (1000 t)			
- SC-paper	175		
Total production	175		
Sales Revenues			
- SC-paper	157,850	902	100.0
Total Sales Income	157,850	902	100.0
Variable Costs			
- Chips	8,430	48	5.3
- Purchased pulp	20,291	116	12.9
- Filler and Additives	17,904	102	11.3
- Energy	10,990	63	7.0
- Op. supplies and pkg	8,838	51	5.6
Total Variable Costs	66,453	380	42.1
Contribution Margin			
Fixed Costs			
- Personnel	13,550	77	8.5
- Other fixed costs	12,150	69	7.7
Total Fixed Costs	25,700	147	16.3
Total Manufacturing Costs	92,153	527	58.4
Operating Profit	65,697	325	41.6
Operating Profit %	41.6		
Capital			
- Fixed investment	320,000	1829	202.7
- Change in working capital	23,678	135	15.0
- Interest during construction	26,585	152	16.8
Total Capital	370,262	2116	234.6
ROI %	17.7		
IRR before financing %	13.3		

SENSITIVITY

The sensitivity of the internal rate of return (IRR) is shown in Figure F.6.2.

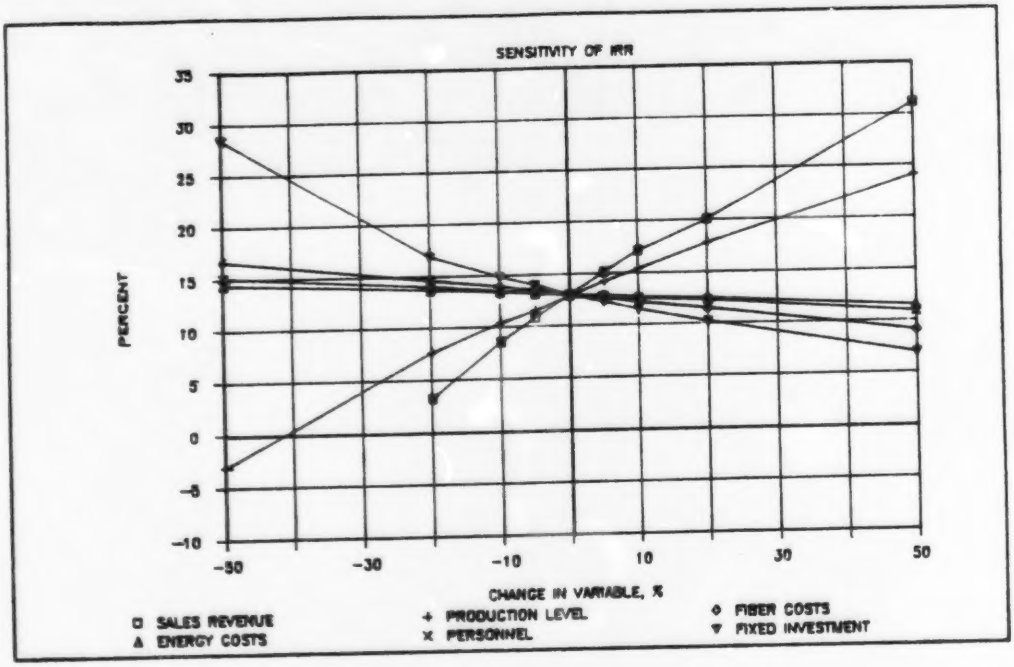


Figure F.6.2. SENSITIVITY OF IRR FOR A SC PAPER MILL 175,000 TP/YEAR

According to our preliminary calculations, a SC paper mill investment in Alberta would show an IRR before financing of 13.3 percent for a 175,000 ton/year unit.

The value of IRR is however very sensitive to changes in main cost components particularly in sales revenue and production level.

The prices of wood raw material and purchased pulp are very important for the profitability of the mill in the long run even if the fiber price doesn't seem to affect the SC- or LWC- mill project profitability so drastically. Competitive prices of raw materials and energy build the basis for all pulp and paper operations. It needs to be pointed out here also that the price of filler or coating is relatively high in Alberta due to high transportation costs.

Building a new SC-paper mill indicates reasonable profitability for operations. The final viability of the mill alternatives will however depend on the cost of financing available for the projects.

6.3 Evaluation of the LWC Paper Mill

6.3.1 Paper Furnish and Product End Use

For several purposes LWC papers are alternative to SC grades. LWC paper gives the possibility to use both offset and rotogravure printing methods depending on the type of the used coating paste. The base paper for LWC papers contains mechanical and chemical pulps and the ratio between them affects the runnability of the base paper. The chemical pulp content is usually near 50 percent of the fiber furnish. For rotogravure printing also the smoothness of the base paper is very important. A certain filler content of 4-6 percent is determined by the broke of the coated paper. The amount of coating in LWC papers is only 9-13 g/m^2/side. The properties of the base paper are very important for achieving good quality coating.

Important properties for LWC papers are

1. Sufficient strength for good runnability
2. Printing properties
   * high smoothness, especially for rotogravure printing
   * good printing ink absorption
3. Uniform quality
4. Sufficient brightness and opacity

LWC papers are used for

1. Magazines
2. Catalogues
3. Posters
4. Brochures

The furnish used as base for this evaluation is as follows:

Basis weight	60 g/m^2
Furnish percent of paper	
* chemical pulp (BK)	29
* TMP, bleached	36
* coating	35

6.3.2 Process Description of the LWC Paper Mill

A block diagram showing the LWC paper mill is included in Figure F.6.3.

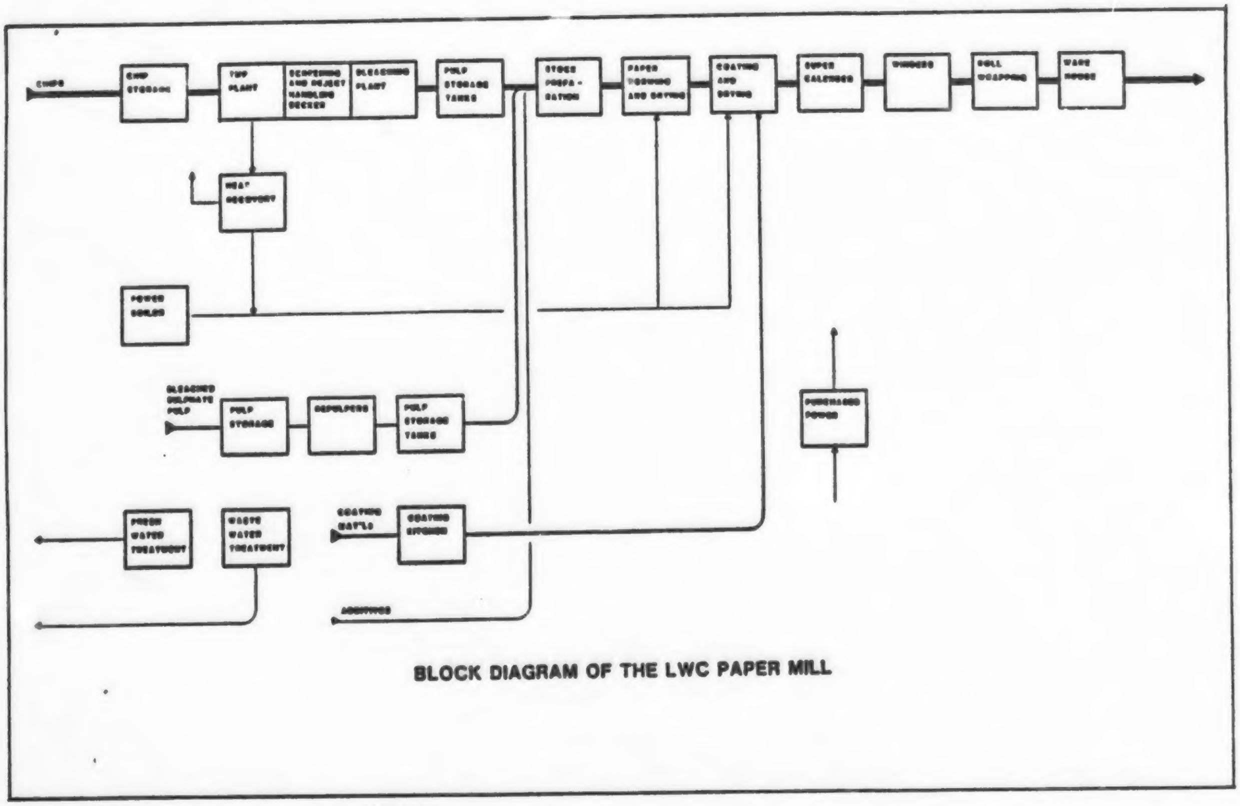

CHIPS
CHIP STORAGE
TMP PLANT
SCREENING AND REJECT HANDLING DECKER
BLEACHING PLANT
PULP STORAGE TANKS
STOCK PREPA-RATION
PAPER FORMING AND DRYING
COATING AND DRYING
SUPER CALENDERS
WINDERS
ROLL WRAPPING
WARE HOUSE
HEAT RECOVERY
POWER BOILER
BLEACHED SULPHATE PULP
PULP STORAGE
REPULPERS
PULP STORAGE TANKS
PURCHASED POWER
FRESH WATER TREATMENT
WASTE WATER TREATMENT
COATING MATL'S
COATING KITCHEN
ADDITIVES
BLOCK DIAGRAM OF THE LWC PAPER MILL

Figure F.6.3. BLOCK DIAGRAM OF THE LWC PAPER MILL

WOOD HANDLING

The wood requirement of the TMP mill integrated with the LWC machine is about 70,000 BDT/year. This is a relatively small amount; therefore it is assumed that only purchased chips will be used.

The purchased chips are weighed on trucks and screened before taking to the TMP mill.

TMP PLANT

The screened softwood chips are fed through a chip bin to the chip washer before preheating. High pressure refining is performed in two consecutive stages and the heat from the refiners is recovered for paper drying (approximately 50 percent). After the steam separation from the second refining stage the pulp is discharged to a latency removal tower. After latency removal the pulp is screened, cleaned and dewatered before bleaching. The pulp is then bleached with peroxide (H_2O_2) and stored in towers for use in the paper mill.

PAPER MILL

The LWC machine includes the following main process units:

* headbox
* fourdriniers
* press section
* drying section
* calender stack
* reel module
* off machine coater
* rereeler
* super calendar
* winders
* salvage winders
* coating color and additive system

Chemical pulp is refined before going through cleaning to the headbox.

The pre-dried paper sheet is coated in an off machine coater and dried by gas/oil/steam heaters. The paper is finished in supercalendars before packaging and transportation to the warehouse.

POWER STATION

Heat is generated from oil and additional to the heat recovered from TMP refining. There is no in house electrical energy generation.

ENVIRONMENTAL PROTECTION

The effluent loads expected from the mill to external treatment are as follows:

* Effluent volume	15-20 m^3/tp
* Suspended solids	8 kg/tp
* BOD_5	12-28 kg/tp
* Color	16-22 kb/tp

The effluent treatment system includes primary clarifier and biological treatment in an aerated lagoon. It is assumed that no color removal is needed. The aerated lagoon will reduce the effluent BOD load by 70-90 percent.

6.3.3 Operating Cost Estimate

The operating cost estimate is detailed in Table T.6.12 below.

Table T.6.5. Operating Cost of a LWC-Mill
* integrated to TMP mill
* purchased bleached kraft pulp

BASIS DATA		
Basis wt	g/m^2	60
Coating	g/m^2/side	10.5
Furnish		
BK, swd	% of fib.	45
TMP, swd	% of fib.	55
Total	% of fib.	100
Coating	kg/tp	350
Coating loss	%	7
Fiber loss	%	2
Production	1000 ton/yr	175
Appx. investment	10^6 CAD	315
Oper. days	d/yr	350

COATING MATERIAL COST

	Coating Recipe %	Unit Cost CAD/t	Coating Cost CAD/t coat	CAD/tp
$CaCO_3$	8.00	275	22	
Del. clay	70.00	303	212	
Ox. starch	13.00	545	71	
S-B latex	8.40	2450	206	
CMC	0.47	5200	24	
Dye	0.13	10000	13	
Total	100.00		548	

OPERATING COSTS

FIBER FURNISH	Unit	Unit/tp	CAD/unit	CAD/tp	CAD/tp
Chips	BDT	0.38	77	30	
BK, swd	ADt	0.31	640.00	199	
Total fiber furnish					229
CHEMICALS					
Coating	t	0.35	548	194	
H_2O_2	kg	11.66	1600	19	
Sodiumsilicate	kg	11.66	320	4	
Ret. aid	kg	10.00	1230	12	
Alum	kg	10.00	230	2	
defoam.	kg	1.00	3000	3	
Other	kg	2.00	1500	3	
Total					237
UTILITIES					
Steam	GJ	4.95	2.25	11	
Power	kWh	1915.00	0.024	46	
Water	m^3	20.00	-	-	
Total					57
PACKAGING MATERIAL					
Core 3"	m	3.0	1	3	
Wrp. pap.	m^2	30.0	0.25	8	
Total					11
TOTAL VARIABLE COST					534

LABOUR					
Ave. work. time	h/year	2000			
Maint. labour	pers 1)	115	23	30	
Oper. labour	pers 1)	145	21	35	
Admin.	pers 1)	45	29	15	
Total					80
MAINT. MAT'L	% on inv.	1.5			27
SUPPLIES					
PM				32	
TMP				6	
Total supplies					38
ADMIN. AND SALES					33
OVERHEAD					12
TOTAL FIXED OPER. COST					190
TOTAL OPER. COST					724
FREIGHT					145
TOTAL					**869**

1) Includes all mill personnel.

6.3.4 Investment Cost Estimate

The investment estimate for a new greenfield LWC-paper mill is given below in Table T.6.13.

Table T.6.6. Estimated Investment Cost

Direct Costs	1000 CAD
Installed equipment, incl. spare parts	211,000
Site	12,000
Buildings	30,000
Freight	10,000
TOTAL DIRECT COSTS	**263,000**
Indirect costs	
Preinvestment studies	3,000
Engineering	22,000
Temporary const. facilities	8,000
Insurance during construction	600
Contingency (6%)	18,400
TOTAL CAPITAL COST	**315,000**

If the TMP mill and the LWC paper machine are installed in connection with an existing mill, the investment demand could be 20-25 percent lower.

6.3.5 Profitability of a LWC-Paper Mill

SALES REVENUE

The sales price for LWC paper was taken as the price of third quarter in 1986, which was 1162 CAD/tp. The mill net price, excluding freight will then be

Market price	1162 CAD/tp
Sales cost (3 percent)	35 CAD/tp
Transportation	145 CAD/tp
Mill net price	982 CAD/tp

PRODUCTION DEVELOPMENT

The production is expected to develop as follows:

Year of operation	Production development, % of Total
1	70
2	85
3	95
4-13	100

During the start-up phase, the following quality discounts are considered:

Year of operation	1	2	3	4	5-13
Discount, CAD/tp	30	15	8	0	0

OPERATING COSTS

Additional manufacturing costs for fiber, chemicals and energy are calculated during the first years of operating due to the higher raw material and energy consumptions.

Year of operation	Additional Costs, %
1	2
2	1
3-13	-

INVESTMENTS

Split-up of fixed investment is as follows:

Year of Operation	% of Total
-2	35
-1	60
1 start-up	5
2-13	-

The annual increase in working capital is considered in the calculation. The total working capital is released at the end of the calculation period.

The working capital is reserved for operations one year before start-up.

CASH FLOW BEFORE FINANCING

The following general terms are applied for the cash flow calculations.

The calculation period is 15 years, including two year construction.

All calculations are made in constant Canadian dollars, cost level being third quarter of 1986.

The profitability of building a new greenfield LWC-paper mill in Northeastern Alberta was determined by means of internal rate of return calculated on cash flow before financing. Also a ROI calculation was carried out for a typical year of operation.1)

The profitability calculations are summarized in Table T.6.7.

The sensitivity of IRR to changes in the most important cost factors is shown in Figure F.6.4.

We conclude that the profitability of a greenfield LWC-paper mill is scant, being 6% in terms of internal rate of return before financing. Long transportation distances for both end products and consumables and raw materials squeeze the profit to be unbearable for the high capital expenditure requested.

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1) (ROI percent = $\frac{\text{100 x operating profit}}{\text{Total capital requirement}}$)

Table T.6.7. Summary of Profitability Calculations

Greenfield LWC-paper mill in Northeastern Alberta, 175,000 t/a

	Ref. year 6 1000 CAD	Per ton of Product CAD/t	Percent of Sales
Production (1000 t)			
- SC-paper	175		
Total production	175		
Sales Revenues			
- SC-paper	171,850	982	100.0
Total Sales Income	171,850	982	100.0
Variable Costs			
- Chips	5,184	30	3.1
- Purchased pulp	34,902	199	20.3
- Coating, filler and Additives	41,461	237	24.1
- Energy	9,993	57	5.8
- Op. supplies and pkg	8,437	48	4.9
Total Variable Costs	99,976	571	41.9
Contribution Margin			
Fixed Costs			
- Personnel	13,990	80	8.2
- Other fixed costs	12,600	72	7.3
Total Fixed Costs	26,590	152	15.5
Total Manufacturing Costs	126,566	723	73.6
Operating Profit	45,284	259	126.4
Operating Profit %	26.4		
Capital			
- Fixed investment	315,000	1800	183.3
- Change in working capital	25,778	147	15.0
- Interest during construction	26,169	150	15.2
Total Capital	366,947	2097	213.5
ROI %	12.3		
IRR before financing %	6.3		

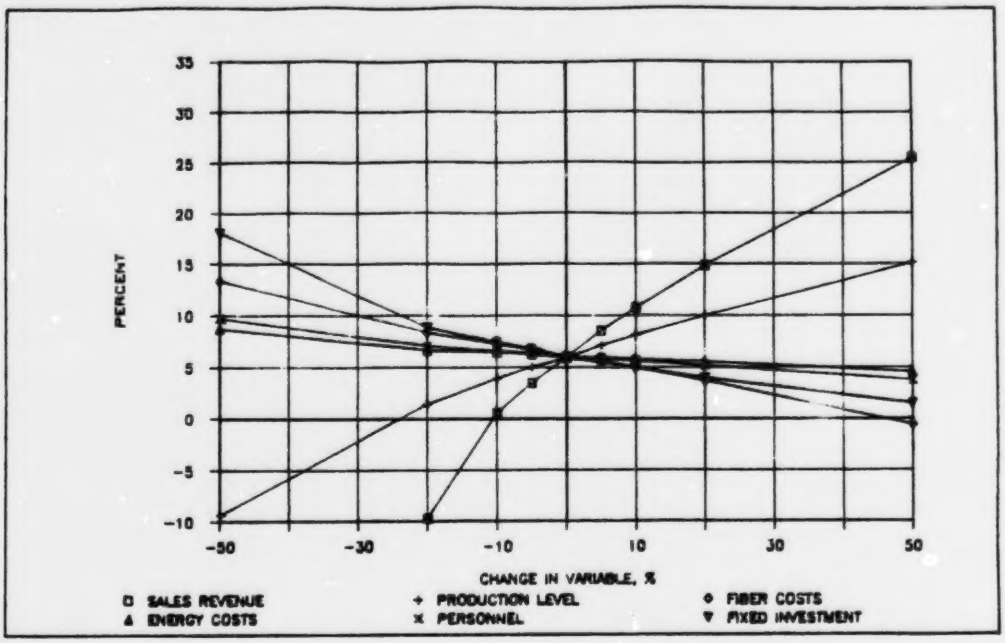

Figure F.6.4. SENSITIVITY OF IRR FOR LWC PAPER MILL 175,000 TP/YEAR

As for the SC mill the IRR is very sensitive to the sales price of the product and to the production level of the mill.

The current (April 1987) list price for LWC No. 5 paper is about 1000 CAD/t or 14 percent lower than the price used in this evaluation.

This price would bring the IRR of the project close to zero. The low price for LWC paper is due to the current overcapacity in LWC paper, and it is difficult to predict which direction the price will take in the future. The low price of LWC is putting pressure on the SC-paper price as well.

7. BUSINESS OPPORTUNITY ANALYSIS

7.1 Wood Resource

One of the fundamental elements for healthy industrial development within the forest products industry is the availability of raw material at reasonable cost. Any serious investor must be convinced that fiber resources are available, both for the needs of today and tomorrow.

The Government of Alberta is in a position to provide good raw material for industrial pulp and paper manufacturing. Much of the wood is high quality softwood suitable for manufacturing paper of the highest quality.

The Alberta total standing timber volume is 2.5 billion m^3 comprised of 63 percent coniferous and 37 percent deciduous species. As of May 1986, the allowable annual harvest is about 25.8 million m^3 comprised of 14.4 million m^3 coniferous and 11.4 million m^3 deciduous species. Of the allowable annual harvest, the committed cut for coniferous and deciduous species is about 10.4 million m^3 and 3.3 million m^3 respectively. Available uncommitted timber that would be negotiable for processing amounts to 4.0 million m^3 of coniferous and 8.1 million m^3 of deciduous species.

Areas of potential large scale timber development in eastern Alberta include; the Athabasca forest, Athabasca/Lac La Biche TDA and the Slave Lake forest. Together with the available adjacent wood supply these areas can annually supply a total of 4.6 to 5.6 million m^3, of which 1.5 to 2.0 million m^3 is coniferous species and 3.1 to 3.7 million m^3 deciduous species. This is sufficient to support value-added paper production and a medium size (500-600 t/day) bleached softwood kraft mill.

7.2 Markets

It is apparent that with its high per capita paper consumption and with its strong purchasing power, the U.S. market is and will remain for the foreseeable future the most attractive market for Canadian paper manufacturers. In addition, U.S. printers and paper consumers have a growing interest in the high quality paper products which are often imported from Europe. Both SC and LWC papers fit this category. This study indicates that the Western U.S. market is the most important and most viable for Alberta based manufacturers of high quality papers considered from cost effectiveness and from market volume and growth.

This outlook assumes that Alberta manufactured paper is sold on a market originating from growth in consumption rather than replacing existing capacity. Specifically, the market assessment for SC and LWC papers shows steady growth in the U.S. market, providing opportunities for Alberta in the near future.

7.3 Transportation

A matter of concern is Alberta's location in respect to the major markets and consumers. High freight costs lowers the profitability of Alberta manufactured paper products.

By entering into value-added, non-commodity, paper grade manufacturing, however, the effect of freight costs can be minimized. Since high quality value-added papers are increasingly being sold on a world market, Alberta has the advantage of being nearer to the single largest market, the U.S., than say, Northern Europe.

The freight cost situation has been studied in detail within the province and discussions are currently under way to find solutions to this problem. These efforts should be continued.

7.4 Risk Factors

The financial analyses in this study show an IRR before financing and taxes to be 13 percent and 6 percent for SC-paper and LWC-paper manufacturing in Alberta, respectively. The corresponding ROI's are 18 percent for SC-grade and 12 percent for LWC-paper.

These values can be compared to a target IRR (before financing and taxes) for pulp and paper projects worldwide of 16-17%. This return covers the average cost of capital available for the project plus a premium for risk. The risk premium depends on local conditions, markets, and the degree of technological innovation. Although this study is based on well developed technology, the remaining risk factors make the IRR's resulting from the analyses only marginally adequate for a stand-alone investment. The challenge for the potential papermaker and Alberta is to mitigate the other risk factors.

The risk elements in a capital investment venture for manufacturing paper in northeastern Alberta are identified below:

Risk Factor	Degree of Risk		
Market	High	Medium	Low
* Price level development	X		
* Market share development	X		
* Currency rate fluctuations		X	
* Competition	X		
* New superior grades	X		
Production			
* Production level	X		
* Wood availability			X
* Wood cost			X
* Energy cost			X
* Human resources			X
* Improved technology		X	
* Production equipment failure			X
Environment			
* Fiscal/legal			X
* Environmental		X	
* Financial	X		

The sensitivity analyses show that the profitability of paper manufacturing is most sensitive to price fluctuations and production rates, or more accurately, the utilization of capital equipment. This risk is best answered by the selection of an investor with the technical and market know-how to produce and sell high quality paper and paperboard.

A related risk factor is the susceptibility of the paper industry to the effects of varying exchange rates. Cost competitiveness may shift rapidly and dramatically between countries due to circumstances beyond the control of the individual company.

Another risk factor identified in the sensitivity analyses is the magnitude of the capital investment. New paper production equipment added into an existing mill requires substantially lower investment costs (estimated 25-40 percent lower than for a greenfield mill) due to savings in existing supporting facilities and activities. Doing so will enhance opportunities for higher rates of return on invested capital. This will be more attractive to a potential investor than will a capital intensive greenfield alternative.

To be able to compete with and show adequate attractiveness compared to an expansion project, the greenfield investment project should receive incentives, financial or other. These incentives would compensate for missing infrastructure in order to bring the potential return on investment up to the level of an "add-on" project.

It has been pointed out above that a stand-alone investment in a value-added paper facility is only marginally adequate. But, as part of a long term development of a forest based industrial complex, it can be. Such a complex might include a world class sized chemical pulp mill to produce the necessary high quality fiber required for paper manufacturing. Given that such a pulp mill producing 1000 tons per day, will consume about 2 million m^3 per year, sufficient wood must be made available to the potential investor. An investor with the capability of carrying out a long term development will want nothing less.

7.5 Business Climate

The current business climate in Alberta for producing wood containing paper or board can be assessed as follows:

Industry Attractiveness

* Market size	+
* Market growth	0
* Market price level	0
* Market cyclically	-

Business Environment

* Legislation	0
* Technical resources	-
* Other human resources	+
* Environmental restrictions	-
* Raw material availability	+
* Raw material quality	+

Market Position

* Domestic market share	+
* Continental market share	-
* Global market share	-
* Market share growth	+
* Competition from locals	-
* Competition from overseas	0

Competitiveness	
* Leadership in quality	-
* Technology	-
* Cost effectiveness	+
* Marketing assistance	+
* Financing capabilities	+
* Leadership in technical back-up	-
* Leadership in logistics	0

+ Favorable
0 Average
- Unfavorable

The availability of raw material, inexpensive energy and the existing positive climate for business development provide Alberta with good opportunities to produce high quality paper grades and to sell these products to the Western U.S. market. Any negatives can be partially addressed by Alberta's adopting or adjusting policies that will make value-added paper manufacturing attractive to the potential investor.

Investments in integration of forest products industry improve the overall economy of a wood producing area. Ultimately, however, it is a question of using the available wood resources to manufacture paper more cost effectively and/or with higher quality than the competitors. It is these two factors which give a competitive edge to a mill or company.

7.6 Investor Profile

A key element in a successful capital investment to manufacture value added paper products in Alberta is the selection of proper investors.

In evaluating the potential investors, special attention should be paid to the following aspects:

- Their understanding of managing a forest products business.
- Their financial situation and the capability of undertaking large investment projects.
- Their marketing capability, know-how and experience including their existing marketing organization.
- Their knowledge of U.S. and Pacific Rim markets
- The availability of technically competent sales back-up personnel.
- Their technology and know-how to produce special grade products such as SC- and LWC- papers.

A qualified company must have a track period of handling the risks inherent in the pulp and paper business and have the capability to implement new business ideas, to introduce new products, and to improve efficiencies in production and marketing.

The following is a list of potential investors, each of which will fulfill most of the above requirements. Profiles of the companies are enclosed in Appendix A.7.

Country/Company	Paper Grades			
	SC	LWC	FBB	News
USA				
Champion Int'l	X	X		
James River		X	X	
Mead Corp.		X		
Consolidated Paper		X		
Boise Cascade		X		X
Weyerhaeuser		X		
International Paper			X	
Federal paper			X	
Potlatch			X	
Westvaco			X	
Jefferson Smurfit			X	
Bowater			X	X
CANADA				
Abitibi-Price Inc.	X	X		X
CIP Inc.	X		X	X
Consolidated-Bathurst	X			X
Kruger		X		X
Cascade Industries			X	
Domtar			X	X
BCFP		X		X
Fraser Inc.		X		X
Repap		X		
FINLAND				
Myllykoski Oy	X	X		
Rauma-Repola Oy	X			
Metsä-Serla	X	X	X	
United Paper Mills Ltd.	X			
Kymmene Oy		X		
Enso-Gutzeit Oy		X	X	X
Tampella Oy				X
SWEDEN				
SCA				X
Stora				X
Papyrus			X	
Iggesund			X	
Holmens Bruk	X	X		
NORWAY				
Saugbruksforennigen	X			
Follum				X
Norke Skog				X

	SC	LWC	FBB	News
GERMANY				
Feldmühle Ag	X	X	X	
Haindle GmbH		X		
ITALY				
Burgo SpA		X		

SC: Supercalendered Groundwood Containing Papers
LWC: Light Weight Coated Groundwood Containing Papers
FBB: Folding Box Board
News: Newsprint